Socioeconomic Research and Monitoring Recommendations for Marine Protected Areas in the Channel Islands National Marine Sanctuary

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FOREWORD

On March 14-16, 2003, over 100 stakeholders and experts met to design a monitoring program for the marine protected areas proposed within the Channel Islands National Marine Sanctuary (CINMS). Forty-six stakeholders and experts participated in the two and one-half day workshop and made recommendations for the socioeconomic component of monitoring.

The CINMS Sanctuary Advisory Council (SAC) wanted to constrain workshop recommendations to the proposed marine protected areas and the planning team wanted to constrain the topic areas to SAC priorities and to topic areas thought to be affordable. Workshop participants rejected these constraints. Workshop participants recognized the many interrelationships between use in and outside the marine protected areas, both biophysical and socioeconomic. Also, the workshop participants wanted to expand the scope to not only monitoring but also necessary broader research addressing the many interrelationships. Some workshop participants also came up with innovative and cost-effective recommendations, which the planning team thought unaffordable.

The workshop participants have made bold recommendations across all user groups, including the general population (i.e., those with nonuse or passive economic use value for marine protected areas). In their entirety, the workshop participants' recommendations, whether the total at the low, medium or high cost options, represent a level of investment without precedent within the National Marine Sanctuary System.

The managing agencies have before them a menu of recommendations, from which they will develop a research and monitoring plan. It will be a major challenge to develop a plan that will please all user groups. Development of a plan will require cooperation and partnerships with both the public and private sectors. Reality is that there will be budget constraints, and this implies tough choices will have to be made. The SAC represents a broad set of stakeholders and could be relied upon to help set priorities in development of the plan. It is highly recommended that the SAC review the workshop participants' recommendations, since the scope of recommendations has expanded since the SAC established priorities pre workshop.

The workshop set of recommendations present both a challenge and an opportunity. Development and implementation of a plan will hopefully foster cooperative management processes.

Dr. Vernon R. (Bob) Leeworthy
Leader, Coastal and Ocean Resource Economics Program
NOAA/NOS/Special Projects

ACKNOWLEDGEMENTS

The most important group to acknowledge for their contribution is the workshop participants. Forty-six social scientists and stakeholders participated in the socioeconomic monitoring workshop. All volunteered their time, and the work shows, they put a great deal of thought into the effort. These participants are also the primary authors of the recommendations in this report.

We would also like to give a special thanks to the University of California – Santa Barbara, Bren School of Environmental Studies students Kris Herrington, Helene Scalliet, Rob Ellis, Katrina Jessoe, and Megan Williams. They took excellent notes for each sub-group and organized the notes in computer format. This was a tremendous aid for organizing the recommendations.

We would like to thank the University of California – Santa Barbara for the meeting rooms and other professional services that made the workshop a success.

Finally, we would like to thank CINMS and CDFG management and staff for supporting the effort. Special thanks to Sean Hastings of CINMS and John Ugoretz of CDFG for taking the lead on workshop support and to Michael Murray of CINMS for helping facilitate several groups on last minute notice.

The Planning Team

PLANNING TEAM

The following people comprised the workshop "Planning Team" and were responsible for putting together this document summarizing the recommendations of the workshop participants.

Dr. Vernon R. (Bob) Leeworthy
Leader, Coastal and Ocean Resource Economics (CORE) Program
NOAA/NOS/Special Projects

Peter C. Wiley
Economist, Coastal and Ocean Resource Economics (CORE) Program
NOAA/NOS/Special Projects

Justin Hospital
ECO Intern/Economist, Coastal and Ocean Resource Economics (CORE) Program
NOAA/NOS/Special Projects

Tom Culliton
Chief, Coastal Resources Assessment Branch
NOAA/NOS/Special Projects

The CORE Program is housed within the following:

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Service
Office of Management and Budget
Special Projects Division
Coastal Resources Assessment Branch

To send comments or find out more about the CORE Program, contact:

Dr. Vernon R. (Bob) Leeworthy
NOAA/NOS/Special Projects – N/MB7
1305 East-West Highway, SSMC4, 9th Floor
Silver Spring, MD 20910
Telephone: (301) 713-3000 x 138
Fax: (301) 713-4384
E-mail: Bob.Leeworthy@noaa.gov
http://marineeconomics.noaa.gov

EXECUTIVE SUMMARY

The recommendations included here for socioeconomic research and monitoring for the Channel Islands National Marine Sanctuary (CINMS) Marine Protected Areas is the result of a two and one-half day workshop held in Santa Barbara, California, March 14-16, 2003. Forty-six stakeholders and experts attended the workshop and developed a menu of recommendations from which the managing agencies will develop a research and monitoring plan.

There is no minimum set of recommendations that could be selected that would make all stakeholders and experts happy. So it will be a great challenge to develop and implement a research and monitoring plan from the set of recommendations included in this report.

The planning team did organize the recommendations into three funding options or scenarios: 1) low cost, 2) medium cost and 3) high cost. What is included in each option is explained in the Summary of Recommendations section of the report. Each of the three cost options includes recommendations addressing a broad set of issues for each user group. Budget constraints may preclude the managing agencies from funding even all the recommendations in the low cost option. In developing and implementing a research and monitoring plan, the managing agencies will be forced to make tough choices. There are a couple of recommendations which the workshop participants thought were must-do's. The recommendations had to do with the proposed Administrative Structure.

Priority Recommendations:

1. **Hire a Social Science Coordinator.** Workshop participants thought that this person should be hired under a contract, not a government employee and wanted the User's Group Oversight Committee to have a say in the selection of this person.
2. **Create an Oversight Committee and a Peer Review Committee.** Workshop participants recommended creation of these two committees to give user groups input into the socioeconomic research and monitoring plans and ensure good science through peer review of any proposed projects. The User's Group Oversight Committee would also aid in developing solutions to proprietary data issues and working with user groups to get cooperation with approved projects.
3. **The SAC Should Review the Current Set of Recommendations and Establish Priorities.** The SAC had met pre workshop and developed a list of project topics and ranked them within user groups. Workshop participant recommendations expanded the scope of the SAC's list of project topics and recommend that the SAC revisit this issue in light of the workshop recommendations.
4. **CINMS and CDFG Should Aggressively Seek Funding Support.** Workshop participants recommended aggressive efforts to get CINMS and CDFG funding support as well as efforts to get funding and partnerships with other government agencies and nonprofit groups.

The Workshop Planning Team had the following recommendations:

1. **The SAC meet and establish socioeconomic measurement thresholds.** When a socioeconomic measure exceeds a threshold level, it defines the need for some management action. A management action could include altering a management strategy or regulation or it could include compensation or assistance programs for those negatively impacted by a management strategy or regulation. Socioeconomic measurement thresholds are "social value judgments" and are best left to the political process, for which the SAC is well suited. Social scientists can measure changes in socioeconomic measures, but they cannot make judgments as to what is an acceptable or unacceptable change on particular individuals of groups.
2. **Evaluation of Socioeconomic Impacts must include information on factors other than the marine protected areas.** Marine protected areas regulations do not exist in a vacuum. Socioeconomic impacts (both positive and negative) could be due to a variety of factors unrelated to marine protected areas regulations. Changes in regional environmental and socioeconomic conditions may be the cause of changes in socioeconomic measurements. Other management strategies and regulations, along with changes in regional and socioeconomic conditions must be accounted for in any evaluation of socioeconomic impacts. To accomplish this it is important to keep track of efforts in other agencies and cooperate and possibly partner in larger regional studies

Socioeconomic Research and Monitoring Recommendations for Marine Protected Areas in the Channel Islands National Marine Sanctuary

Purpose

This document provides a menu of recommendations, along with an Organizational/Administrative Structure for implementing a socioeconomic monitoring program for the marine protected areas in the Channel Islands National Marine Sanctuary (CINMS). ***This document is NOT a socioeconomic Research and Monitoring Plan.*** The CINMS and CDFG can pick and choose from among recommendations presented here when developing their research and monitoring plans.

There was a consensus among workshop participants that the status quo approach to funding socioeconomic work is unacceptable and there is a fundamental need to build the necessary infrastructure to support the socioeconomic monitoring program. Most importantly, the workshop participants recognize that building the infrastructure will cost more than previous experience has allowed. Bold actions are recommended. First among these is the requirement of hiring a Social Science Coordinator as described in the Proposed Organizational/Administrative Structure. Second, an aggressive effort to get CINMS and CDFG funding support as well as efforts to get funding and partnerships with other government agencies and private nonprofit groups (NGOs) is required. A full, prioritized menu of research needs provides outside researchers the opportunity to select relevant projects and seek funding for them, as a complement to what tasks government agencies may be able to do themselves. This strategy has been successful in the Florida Keys National Marine Sanctuary, where a wide range of institutions and researchers all contribute pieces of the overall monitoring program.

The Sanctuary Advisory Council's recommendations and priorities are included in Appendix B to provide some guidance on priorities. These were developed prior to the workshop, and many workshop participants felt they did not accurately reflect the real research priorities for the CINMS. It may be useful for the SAC to revisit its own priority list in light of the recommendations of the workshop.

Introduction

As noted above, all the recommendations in this report are the product of a workshop held in Santa Barbara, California (March 14-16, 2003).

The report first provides some background information on how the socioeconomic portion of the workshop was organized and implemented. Appendices to the report document some of the important information used in this workshop.
Next, some guidelines and key considerations for research and

monitoring are presented. Important uses and interpretation of research and monitoring information are discussed, as well as important distinctions between the information requirements of assessments versus monitoring.

A summary of the recommendations is provided with tabular summaries followed by explanations of each option represented in the summary table. The summary recommendations are then followed by the detailed recommendation profile sheets filled-out at the workshop and refined post-workshop.

A Glossary and list of acronyms is included to help with definitions of many socioeconomic terms that are used throughout the report.

Organization of this Report

The first section provides background information on the organization and implementation of the socioeconomic portion of the workshop. Appendices A-D provide the list of workshop participants (with contact information) and other information used in informing workshop participants.

The second section provides some guidelines and key considerations for the user and interpretation of research and monitoring information.

The third section describes the proposed Organizational/Administrative Structure for implementing the Socioeconomic Research and Monitoring Program. This is presented first because the workshop participants thought that this was fundamental to get the program up and running.

The fourth section summarizes all the recommendations and their corresponding costs. The recommendations are organized by user group and the three funding scenarios presented (low, medium and high cost scenarios). The low cost scenario would provide the bare minimum of information, while the high cost option would be considered the complete information scenario.

The fifth section of the report contains the complete write-ups for each recommendation with distinctions of what is recommended to be done under each funding scenario. Each recommendation addresses the following 10 items:

(1) Question/Topic/ Goal and Objective: Description of proposed measurement/activity, question addressed, and goal and objectives supported.
(2) Baseline Measurement(s): Assessment of the availability and adequacy of baseline measurement(s).
(3) Classification of Monitoring Activity: Data Collection and/or Modeling and Analysis.
(4) Justification: Why do this? This includes justification of why one should choose a more expensive funding option.
(5) Description of Data Collection/Modeling and Analysis: This would include methods of data collection and/or modeling analysis.
(6) Timing: How long will it take to obtain measurement and/or perform modeling and analysis? Also, how frequently the measurement or activity should be done.

(7) Spatial Resolution/Scope of measurement or activity.
(8) Cost: Here we distinguish between initial start-up costs when baselines are not available and the costs of replicating measurements. Also, distinguish between low, medium and high cost alternative.
(9) Staff: As with costs, staffing requirements in terms of full-time equivalent number of employees (FTEs) for initial start-up (baselines) and replications. Also included here are assessments of the use of volunteers and restrictions that require Oversight Committee approvals for protecting proprietary data.
(10) Funding Sources: In addition to CINMS and CDFG possible funding, other possible funding sources or potential partnerships.

The write-ups for each user group are presented in the following order:

(1) Commercial Fishing
(2) Recreation: Consumptive and Nonconsumptive
(3) Nonuse or Passive Economic Use Values
(4) Education, Research and Outreach
(5) Potential collaborative efforts between the Socioeconomic Monitoring Plan and the Biological Monitoring Plan

Following the detailed recommendations, a Glossary/List of Acronyms, References and a set of Appendices is provided. Appendix A includes a list of participants and contact information. Appendix B includes the SAC Recommendations/Priorities (Pre Workshop). Appendix C includes the "What We Know" document (Pre Workshop) and Appendix D includes the Workshop Agenda.

Background

In preparing for the socioeconomic portion of the Channel Islands Marine Protected Areas[1] Monitoring Workshop, the planning team undertook a number of tasks that involved the compilation of materials, the identification and vetting of issues, and the design of a program that would have the greatest potential to arrive at a working set of socioeconomic monitoring proposals. One of the first tasks was the drafting of a set of socioeconomic monitoring activities.

The planning team drafted the list in conjunction with sanctuary staff. This list was then the subject of a priority ranking exercise by the Sanctuary Advisory Council (SAC) (see Appendix B). The list included three major categories of activities based upon the user group to which the activity was applicable. These included commercial fishing, recreational fisheries/consumptive diving, and recreational non-consumptive activities. The first two categories of activities contained five potential activities. The third contained five as originally drafted, and then the SAC added two more. The SAC also added additional elements to several of the originally drafted activities in all of the categories.

Also written at this time was a document entitled, "What We Know" (see Appendix C). This document was a guide, for the SAC and for workshop participants, to existing socioeconomic

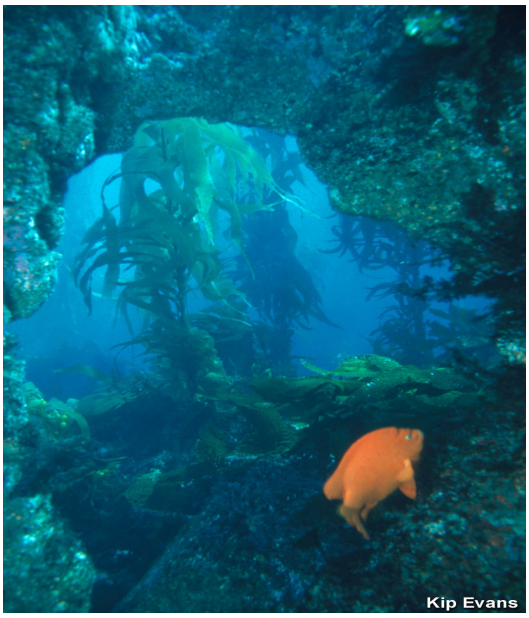
[1] Includes 11 Marine Reserves, 1 Marine Conservation Area, and 1 State Marine Park (see glossary for definitions)

information for each of the user groups. It represented the state of knowledge with regard to the socioeconomic attributes of the uses and users of resources within the marine protected area system.

At this point in the process, the planning team was enhanced by expertise in planning and facilitation and several other tasks commenced. One of the first was the proposal of breakout groups, which were organized by major user group (as identified in the list of socioeconomic monitoring activities). The commercial fishing user group included breakout groups to address the topics of catch, value and edge effect (S1a), and economic and social (S1b). The consumptive recreational fishing category included breakout groups to address the topics of use, catch and edge effects (S2a) and economic and social (S2b/S3b). The non-consumptive recreation category included breakout groups addressing: use/use in marine reserves (S3a), and economic and social (S2b/3b) (which was a joint group with the consumptive users). Also present was a joint socioeconomic and ecological group, which focused solely on education, research, and outreach (J1). During the workshop, a group of individuals took it upon themselves to develop recommendations to address non-user values associated with the marine protected areas, and while not assigned as a group by the workshop coordinators, they independently formed the non-user breakout group (S4).

While the groups were being designed, sanctuary staff, in conjunction with the socioeconomic monitoring planning team, was compiling a list of potential participants. It was important that the list included both stakeholders and experts for each of the breakout groups. Later in the process, when invitations were sent and the final list was shaping up, several more potential participants were added to the list to ensure coverage for all the breakout groups.

During this process, the data collection system, with which the coordinators of the workshop were to collect the data, was being designed. The system had three main components. Information was collected from breakout groups with Worksheet A, a poster sized form with which the facilitator was able to guide the group while collecting the necessary data elements for each topic area. The second element was Worksheet B. This worksheet took the form of a Microsoft Access Database that allowed participants to easily enter their recommendations, while allowing



A garibaldi in the Kelp Forests of the subtidal zone in the Channel Islands National Marine Sanctuary

coordinators to maintain a central database for the responses. The companion to Worksheet B was a Lookup Table, which included categories of answers to clarify to participants what was needed for a particular data element, while not limiting their input on those items. Additional materials that were designed concurrently included the agenda, a document entitled "Guidelines for the Use of Socioeconomic Analysis", which was a guide for participants to locate and use appropriate sections of the report entitled *Socioeconomic Impact Analysis of Marine Reserve Alternatives for the Channel Islands National Marine Sanctuary*, and a literature summary for knowledge attitudes and perceptions of other management strategies and regulations. Also compiled at this time was a citation form, with which participants could bring other literature to the attention of the coordinators and the workshop participants. The planning team had to ensure coverage for each breakout group by confirmed participants; however, there were several participants who would be appropriate for several groups. Additionally, the participants often had their own opinions about which group they felt they could contribute the most to. The scheduling of the breakout groups had to take all of these factors into account, while at the same time remaining within the framework of the overall workshop schedule.

Guidelines and Key Considerations for Research and Monitoring

The following guidelines and key considerations discuss how research and monitoring information can be used and interpreted.

Goal, Objectives and Implementation Recommendation Marine Reserves Working Group

The Marine Reserves Working Group (MRWG) for the CINMS reached consensus on the following goal, objectives and implementation recommendation regarding the socioeconomics of marine protected areas.

GOAL: *To maintain long-term socioeconomic viability while minimizing short-run loss in activity for all users and dependent parties.*

Objectives:

1. *To provide long-term benefits for all users and dependent parties.*
2. *To minimize and equitably share short-term loss in activity for all users and dependent parties.*
3. *To maintain the social and economic diversity of marine resources harvest by equitably sharing the loss of access to harvest grounds among all parties to the extent practical when designing reserves.*
4. *To address unavoidable socioeconomic losses created by reserve placement through social programs and management policy.*

Implementation Recommendation:

To measure socioeconomic impacts by monitoring and evaluating the benefits and impacts to all users and dependent parties inside, adjacent to, and distant from reserves.

Monitoring activities/measurements must be mapped into the goal and objectives. This provides the basis for evaluating the effectiveness of the MPAs. Pomeroy, Parks and Watson (2002) provide a framework for evaluating MPA effectiveness, but they also distinguish between management effectiveness evaluation and a monitoring and evaluation program:

"It should be noted that a management effectiveness evaluation is different from a monitoring and evaluation program of the MPA. Whereas evaluating management effectiveness measures the degree to which the MPA is achieving its goals and objectives, a monitoring program is much broader in scope. A monitoring and evaluation program measures the achievement of goals and objectives, but it also is used to keep track of the implementation of activities and to evaluate the success or failure of the activities. Adequate monitoring allows the activities of the MPA to be fine-tuned and to be more effective. A management effectiveness evaluation, while being independent, should also be considered as part of the MPAs monitoring and evaluation program."

Monitoring is done within the context of adaptive management. Adaptive management is the cyclical process of systematically testing assumptions, generating learning from evaluating results of such testing, and further revising and improving management practices. The result of adaptive management in a protected area context is improved effectiveness and increased levels of achievement toward goals and objectives.

Interpretation of monitoring measurements, especially socioeconomic, is not straightforward. Separating out the extent of a change in a measurement that is related to MPAs versus other factors is a difficult and sometimes impossible task. National and regional economic conditions, environmental conditions (e.g., El Nino), and other management strategies and regulations will effect many socioeconomic measurements. So, a monitoring program must incorporate information on these other factors to support evaluation.

Another key issue in evaluating a monitoring measurement is the issue of ***measurement thresholds***. Throughout the two-year process of designing the MPAs, user groups asked the socioeconomic team for guidance on when an impact was considered to be significant. The socioeconomic team maintained that social scientists are limited in their ability to make judgments about the significance of socioeconomic impacts. There are administrative definitions of significance such as under Executive Order 12866, which states that impacts from Federal regulations exceeding $100 million turn on the requirement of conducting a benefit-cost analysis.

National Standard 8 of the Magnuson-Stevens Fishery Management Act (MSFMA) addresses impacts on fishing communities. This is a three-step

process. First, all communities in the area of impact are identified. Counties are not considered small enough to be considered communities. Instead, Census Designated Places (CDPs) and cities/towns are considered to be the proper scale for communities. CDPs are places with a population of 2,500 people or more for which the U.S. Bureau of the Census organizes census of population information. Once communities are identified the next step is to determine if a community is a fishing community. A fishing community is a community defined by the 20% rule. If 20% of a community's population, employment, or income is directly or indirectly dependent on the fisheries (commercial and recreational), then a community is a "fishing community". The third step is to determine if the management strategy or regulation proposed is expected to impact more than five (5) percent of fishery revenues in the fishing community. If so, then a full Social Impact Analysis must be conducted.

In both the case of E.O. 12866 and National Standard 8 of the MSFMA, these are administrative finds of significance and simply turn on other study requirements.

Another type of finding of significance that social scientists can make is the significance of economic impact on local, regional or the National economies (e.g. changes in sales/output, income and employment) and/or the fiscal impacts on local (county), regional or the National governments (e.g., government revenues and expenditures). Social scientists can analyze policy options to determine the magnitude of the impacts; expressing them in proportions (e.g., option A will result in a 10% increase in net benefits a 15% increase for group A and a 20% decrease for group B). They also (similar to biological scientists) may express quantitative impacts in terms of confidence intervals. What ***social scientists are not able to do is give guidelines for when impacts become significant to particular individuals or user groups.*** These are "social" value judgments that are best left to the political process.

In order to evaluate significance of socioeconomic impact on individuals or specific user groups, measurement thresholds must be established in the political process. Measurement thresholds indicate when a measurement reaches a level considered to be a significant impact, and that managers should take some action. This is how measurements, and their evaluation, fit into the adaptive management framework. Establishing thresholds is a necessary activity and would be an appropriate activity of the Sanctuary Advisory Council.

Research and Monitoring Program versus Monitoring Program for Marine Protected Areas

Initially, the CINMS SAC wanted to limit the monitoring program to MPAs. The prioritized list of recommended measurements developed prior to the workshop (See Appendix B) were limited to those measurements directly related to MPAs. The workshop participants disagreed with this approach and wanted a more expansive research and monitoring program for the CINMS. Many thought that a complete menu of ideas be developed with links to outside activities that are important to providing the ability to complete evaluations of

monitoring data. Social scientists emphasized that conditions both inside and outside MPA boundaries follows from understanding of interactions between them and associated activities.

The workshop planning team originally classified nonuse or passive economic use value as outside the scope of a basic socioeconomic monitoring program for MPAs because their experience was that

Kayaking in the Channel Islands National Marine Sanctuary (photo: Chris Gotschalk)

the expense of reliably estimating these values would be beyond any expectations of future budgets. However, workshop participants disagreed with the planning team's assessment and have proposed innovative and cost effective methods to address nonuse or passive economic use values. Others that felt constrained by the planning team's pre-workshop materials and guidance, were given the opportunity to fill out additional measurement activity forms to address their concerns.

Many studies are done in a larger regional context, but have application to the CINMS. Examples include studies on the recreational fisheries by NOAA's National Marine Fisheries Service (NMFS) where expenditure profiles are obtained that would support assessments of translating recreational use estimates into local (county) and regional economic impacts (e.g., output/sales, income and employment). Also, NMFS supports regional modeling for estimating recreational fishing user values (consumer's surplus). NMFS also has plans for conducting several costs and earnings studies for recreational charter/party boat operations as well as commercial fishing operations. The Pacific Fishery Management Council (PFMC) has also developed the Fishery Economic Assessment Model (FEAM) that can be used to translate ex vessel value of landings by species/species groups and ports into estimates of local (county) and regional economic impacts (income and employment). NMFS and PFMC might also conduct future studies on econometric supply and demand of the commercial fisheries.

It is necessary for CINMS and CDFG to keep track of the plans of NMFS and PFMC and cooperate and possibly partner in larger regional studies that would support the needs of the CINMS Research and Monitoring Program.

Monitoring versus Assessment Accuracy of Measurements

The requirements for accuracy of monitoring measurements are much higher than the requirements for assessments in the design and support of analyses for establishing regulations for marine protected areas. Variances of estimates might be acceptable for assessments, but not good enough to provide reliable baselines for a monitoring program. A monitoring

program requires estimates with small enough variances that one can make inferences as to whether the measurement has increased or decreased over time.

In the assessment of MPA alternatives (Leeworthy and Wiley, 2002 and 2003), the data used for accessing the CINMS from private household boats was not of good enough quality (low enough variances) to support an adequate baseline for the monitoring program. Here, a new data collection activity would have to be designed and implemented to provide an adequate baseline for the monitoring program. In each recommendation presented in this document, we include an assessment of available baseline measurements.

It is not correct to conclude that one cannot implement a management strategy until all baseline estimates for monitoring are in place. Nothing could ever be done with such a criterion. It is almost always true that management will have to learn to work with floating baselines for many measurements. Social scientists have developed many qualitative techniques (e.g., ethnography and historical analysis) that can provide some rough guidance about historical baselines. This is also the reality and challenge of applied research.

Organization/Administrative Structure
(Priority Recommendation)

With the large number of socioeconomic and other monitoring projects going on that require the active participation of user group participants, the program will need to be scientifically valid, trustworthy, and use participants' time effectively. Workshop participants have identified two key steps that need to be taken; (1) a socioeconomic research coordinator and (2) a collaborative oversight committee.

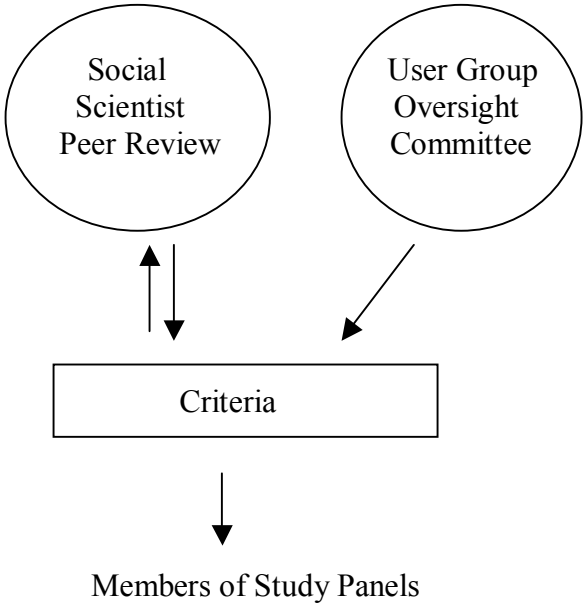
1. **A socioeconomic research coordinator**, who will keep track of all research activities and do outreach for the program. This person will make sure there is coordination among research projects (commercial, recreational, and collaborative biological work) in terms of working with user group participants, distributing surveys, holding meetings, etc. This person would also serve as the point of contact for people interested in participating in research or looking to develop proposals. This person will also do some of the data collection, analysis, and report writing. ***This person should be hired as soon as possible.*** Because of the importance of this person being perceived as neutral, the workshop participants were most comfortable with having an independent contractor. The oversight committee should have input into the selection of this person, or, if the committee has not yet been constituted other user group and community representatives should participate in the selection process.

2. **A collaborative oversight committee.** This committee consists of two sub-committees: 1) User Group Oversight Committee and 2) Social Scientist Peer Review Committee. The oversight committee would write the requests for proposals and set research priorities. These priorities would be published, as a catalog of research needs annually. The oversight committee would develop confidentiality protocols and define the rules about proprietary

data access and use. Members of the oversight committee would be nominated by the users groups themselves or their organizations and should represent the world of users who utilize the Channel Islands, covering a range of experience, age, as well as sectors. The Social Scientist Peer Review Committee should review all responses to project requests for proposals. Social scientist members of the peer review committee should also represent a range of disciplines. This could be based on the New England research consortium[2]. Panel members would be compensated for their time and travel. An independent body such as the California Sea Grant Advisory Panel would select committee members. This committee would have input on the selection of the research coordinator. For the first year, the committee would meet every two months and then meet about twice a year.

3. **Criteria.** Criteria for reviewing responses to request for proposals must be developed. The user oversight committee and the social scientist peer review committee will develop the criteria jointly.

Collaborative Social Science Oversight Committee



Oversight Issues

1. Trust, Confidentiality (Access to, and protocols for protecting, proprietary data)
2. Composition of scientists, fishers, etc. in studies and monitoring
3. Who is going to manage/direct all of this monitoring research?
4. Threshold/Criteria

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[2] The Northeast Consortium was created in 1999 to encourage and fund effective, co-equal partnerships among commercial fishermen, researchers, and other stakeholders to become active participants in cooperative research and development of selective fishing gear technology. As part of this effort, commercial fishing vessels will be equipped and utilized as research platforms. Commercial fishermen and commercial fishing vessels from New Hampshire, Maine, and Massachusetts are particularly encouraged to participate in cooperative research using these funds; the expected focus of the activities includes the Gulf of Maine and Georges Bank.

The Northeast Consortium consists of four research institutions (University of New Hampshire, University of Maine, Massachusetts Institute of Technology, and Woods Hole Oceanographic Institution), which are working together to foster this initiative. Each institution has designated an individual who serves as a representative to the Consortium. The representatives administer the Northeast Consortium funds, interface with all stakeholders, and are responsible for funding decisions. A ~30-member Advisory Committee comprised of members from industry, research institutions, government regulatory agencies, and environmental groups provides programmatic advice and guidance and makes recommendations regarding the selection of projects to the representatives of the Northeast Consortium. http://www.northeastconsortium.org

Summary of Recommendations

In developing individual recommendations, the workshop participants often chose to form integrated recommendations instead of narrowly focusing on topics such as measurements of use. Under recommendation titles such as Use, Catch and Value, recommendations included not only measurements on use, catch and value, but also measurements and evaluations with respect to social and economic measures.

Each individual recommendation has been assigned a unique identification code. The first two digits identify the user group (e.g., Commercial Fishing – S1, Recreation-Consumptive-S2, Recreation-Nonconsumptive-S3, Non-use or Passive Economic Use Value-S4, and Education, Research and Outreach-J1). These were the same codes used in organizing workshop materials. Within each user group, each recommendation was given a sequential number code preceded by an underscore, i.e., S2_2 would be the second recommendation for the Recreation-Consumptive user group.

Costs or ranges of costs are summarized in Table 1. Costs are presented by user group and by topic and are organized into three funding options or scenarios: 1) Low Cost, 2) Medium Cost, and 3) High Cost. It is important to recognize that the ***columns in Table 1 are not additive***. The reason is that a low cost option for one topic may be contingent on choosing a medium or high cost option for another topic area. For example, costs for Edge Effects for Recreation-Consumptive Users are listed as zero ($0) for low and medium cost options. This is because edge effects can be incorporated into the medium and high cost options for Use and Catch for Recreation-Consumptive Users.

In the description below, we summarize the low, medium and high cost options for each topic area. The unique recommendation codes are used when indicating dependence on multiple recommendations. Sometimes we constructed cost options by combining efforts across user groups within the Socioeconomic Monitoring recommendations or with Ecological Monitoring recommendations.

Costs in Table 1 are annualized, so for a recommendation that is to be done every five years, the total costs have been divided by five. The summary write-ups indicate when costs represent annualized costs for an item that will not be conducted every year. In addition, when baseline measurements are not currently available, estimates are provided for developing baselines.

Total and sub-total costs are not simply the sum of the low, medium or high cost options, since low costs options for one topic may be contingent on selecting a medium or high cost option for another topic. We have put together low, medium and high costs options for sub-totals for each user group and the total across all user groups. These are explained below. The research questions answered by each effort can be found in the individual recommendation write-ups.

Table 1. Summary of Annualized Implementation Costs

User Group/Recommendation	Thousands of Dollars Low	Medium	High
Organizational/Administrative Structure			
1. Social Science Coordinator	$50 - $75	$50 - $75	$50 - $75
2. Social Science Peer Review	$10 - $15	$10 - $15	$10 - $15
3. User Oversight Committee	$10 - $15	$10 - $15	$10 - $15
sub-total	**$70 - $105**	**$70 - $105**	**$70 - $105**
Commercial Fishing (S1)			
1. Use, Catch and Value	$1 - $10	$50 - $60	$300 - $500
2. Edge Effect	$0	$0	$100 - $200
3. Displacement	$0	$50 - $100	$50 - $100
4. Knowledge, Perceptions and Attitudes	$5	$16 - $33	$16 - $33
5. Socioeconomic Profiles	$0	$10 - $20	$10 - $20
sub-total	**$80 - $160**	**$180 - $360**	**$300 - $500**
Recreation Users (S2 and S3)			
1. Use and Catch - Consumptive Users	$25 - $50	$150 - $250	$225 - $350
2. Edge Effects - Consumptive Users	$0	$0	$0
3. Knowledge, Perceptions and Attitudes - Consumptive and Nonconsumptive Users	$0	$0	$0
4. Use and Economic Values of Reserves - Nonconsumptive Users	$25 - $35	$25 - $50	$25 - $50
5. Option Values of Consumptive Users of Reserves	$25 - $50	$50 - $100	$100 - $200
sub-total	**$75 - $150**	**$250 - $450**	**$325 - $550**
Nonusers - Passive Economic Use Value (S4)			
1. Value of Reserves to Nonusers	$25 - $50	$50 - $100	$100 - $200
sub-total	**$25 - $50**	**$50 - $100**	**$100 - $200**
Education, Research and Outreach (J1)			
1. Education Values	$10 - $25	$10 - $25	$50 - $100
2. Scientific Values	$0	$10 - $30	$50 - $100
3. Public Outreach	$0	$0	$0
sub-total	**$10 - $25**	**$20 - $55**	**$100 - $200**
Total All Costs	**$260 -$490**	**$570 - $1,070**	**$895 - $1,555**

Cost Option Explanations

The following includes explanation of the cost options included in Table 1. At the bottom of each cost option there are four summary elements:
(1) Frequency – How often must the measurement(s) be taken?
(2) Duration or Timing – How long will it take to obtain the measurement(s)?
(3) Baseline Cost – If adequate baseline measurement(s) do not exist, what will it cost to obtain a baseline measurement?
(4) Annual Cost – this represents "annualized cost".
For measurements that are taken every five years, the costs are divided by five.

Some recommendations have zero ($0) costs. Costs are not exactly zero, but the recommended measurements can be obtained by combining with other recommendations for very little cost. The ranges of costs given for the main activity are thought to cover the additional costs. The main activity for which the recommended measurement(s) are to be combined are included in parentheses next to the estimated costs.

Commercial Fishing (S1)

1. Use, Catch and Value

Low (S1_1): This option entails the basic compilation and analysis of CDFG landings data, which are recorded at 10-minute by 10-minute blocks. It includes refining the 14 species/species groups used in the initial Channel Islands analysis (see Leeworthy and Wiley 2002, 2003) by separating out White Sea bass from species group 12 (Sculpin & Bass) and California halibut from species group 7 (Flatfishes). Also, add salmon to the monitoring effort. Catch and Value of Catch data should be compiled by year, fisherman, species, gear, and port where landed; then placed in a GIS, and using FEAM multipliers to estimate income and employment impacts on county and regional economies. Fishing vessel id's can be encoded to protect proprietary information, provided they enable the analysis of fishing activity across fisheries, locations and years.

Frequency: Annual
Duration: 2 months
Baseline Cost: $1,000 - $10,000
Annual Cost: $1,000 - $10,000

Medium (S1_1): This option requires doing everything included in the low option, plus some additional items. Fill gaps in social and economic data for the baseline and replicate social and economic measures annually. Use ethnography to collect and analyze local knowledge (e.g., fishermen's experiential knowledge), including interpretation of logbook and other existing information.

Frequency: Annual
Duration: 2-3 months
Baseline Cost: $50,000-$60,000
Annual Cost: $50,000-$60,000

Commercial Fishing Vessel in the Channel Islands National Marine Sanctuary

High (S1_2): This option integrates the entire data collection and analyses for the commercial fishing group into one recommendation. This option includes everything in the medium option, plus several additional items. Obtain distributions of catch and value of catch at 1-minute by 1-minute spatial resolution. Also obtain detailed costs and earnings by species/species groups and socioeconomic profiles of commercial fishermen. Use rapid assessments and other techniques to map social and economic networks, including market channels and market mark-ups for fishery products (e.g., harvest, Wholesale buyers/processors, local retail and restaurant and amount exported from local area). Analyze the data to determine the spatial and temporal distributions of positive and negative impacts on commercial fisheries and associated communities. In addition, train fishermen and scientists in the use of on-water data collection technology.

Frequency: Annual
Duration: 12 months
Baseline Cost: $300,000-$500,000
Annual Cost: $300,000-$500,000

2. Edge Effect

Low (S1_3): This option requires that the high cost option for Use, Catch and Value (S1_2) be implemented. The 1-minute by 1-minute catch distributions could be supplemented with logbook information to get estimates of catch along the edges of the MPAs. Surveys could be added to get reasons for moving and locating on the edges.

Frequency: Annual
Duration: 12 months
Baseline Cost: $0 (see S1_2)
Annual Cost: $0 (see S1_2)

Medium (S1_3): This option requires that the high cost option for Use, Catch and Value (S1_2) be implemented. In addition to the activities in the low option, aerial photographs could be added to establish use along the edges of the MPAs.

Frequency: Annual
Duration: 12 months
Baseline Cost: $0 (see S1_2)
Annual Cost: $0 (see S1_2)

High (S1_3): This option requires that the high cost option for Use, Catch and Value (S1_2) be implemented. In addition to the activities in the low and medium options, surveys of fishermen would be added to address issues on perceptions of crowding and whether fishing on the edge is increasing economic returns. The latter could be addressed by use of a sentinel fisherman that allows fishing inside the reserves; on the edge of reserves and outside reserves in control areas to establish catch per unit of effort (CPUE) and costs per unit of effort.

Frequency: Annual
Duration: 12 months
Baseline Cost: $100,000-$200,000
Annual Cost: $100,000-$200,000

NOTE: Under all three cost options, there may be some information that can be more efficiently obtained by combining efforts recommended under the landscape topic in the intertidal monitoring group in the Ecological Monitoring recommendations.

3. Displacement

Low (S1_4): This option requires the high cost option for Use, Catch and Value (S1_2) be implemented. This option requires establishing panels of fishermen to track their catch and financial performance over time. Information on factors other than marine protected areas that can impact catch and financial performance are also gathered to help in the assessment/evaluation of the impacts of MPAs and the need for compensation or assistance programs or changes in management strategies/regulations.

Frequency: Data Collection annual, Evaluation every five years
Duration: 3-4 months
Baseline Cost: $0 (see S1_2)
Annual Cost: $0 (see S1_2)

Medium (S1_4): This option requires the high cost option for Use, Catch and Value (S1_2) be implemented. In addition to the activities in the low option, survey layers are added to the panels to elicit reasons for moving and obtaining data for historical analysis to identify underlying trends in spatial behavior.

Frequency: Data Collection Annual Evaluation every five years
Duration: 3-4 months
Baseline Cost: $50,000-$100,000
Annual Cost: $50,000-$100,000

High (S1_4): Same as Medium option.

4. Knowledge, Perceptions and Attitudes

Low (S1_5): This option relies on the use of existing information for the baseline from Kronman et al (2000), Pomeroy and FitzSimmons (2001) and Pomeroy data collection on squid/wetfish fishermen in MRWG process. Surveys would be conducted every three years to gauge changes in knowledge, attitudes and perceptions of management strategies and regulations, especially marine protected areas.

Frequency: 3 years
Duration: 2-3 months
Baseline Cost: $5,000
Annual Cost: $5,000

Medium (S1_5): This option would develop a new survey to develop better baselines across a broader and more specific set of issues. This option could also include adding this layer of questions to the panels in S1_4 for no additional costs.

Frequency: 3 years
Duration: 3-4 months
Baseline Cost: $50,00-$100,000
Annual Cost: $16,500-$33,500

High (S1_5): Same as Medium option.

5. Socioeconomic Profiles

Low (S1_6): This option requires that the high cost option for Use, Catch and Value (S1_2) be implemented. The high option for Use, Catch and Value includes complete socioeconomic profiles.

Frequency: 5 years
Duration: 6-9 months
Baseline Cost: $0 (see S1_2)
Annual Cost: $0 (see S1_2)

Medium (S1_6): This option is based on a separate new survey that must be

conducted for the baseline and replicated every five years. It assumes the low or medium option has been chosen for Use, Catch and Value (S1_1). This new survey would be a stratified random sample of all commercial fishermen that have fished in the CINMS. Stratification would be based on type of fishery and extent of catch. The attempt would be to replicate the items found in the Barilotti and Pomeroy samples, as found in Leeworthy and Wiley (2002, 2003), but get more representative samples for all of the fisheries.

Frequency: 5 years
Duration: 6-9 months
Baseline Cost: $50,000-$100,000
Annual Cost: $10,00-$20,000

High (S1_6): Same as medium option.

Commercial Fishing – sub-total:

Low (S1): Compile CDFG trip ticket data at 10-minute by 10-minute spatial resolution. Add surveys of commercial fishermen to get socioeconomic profiles, costs and earnings, knowledge, attitudes and perceptions of management strategies and regulations and information relevant to addressing the edge effect of MPAs. Socioeconomic profiles should be done every five years. Costs and earnings could be done from smaller panels every year and added to socioeconomic profiles every five years. Knowledge, attitudes and perceptions should be done every three years. Survey efforts to address the edge effect could be combined with knowledge, attitudes and perceptions every three years.

Frequency: 1-5 years
Duration: 12 months
Baseline Cost: $6,000-$15,000
Annual Cost: $80,000-$160,000

Medium (S1): This option would be the same as the low option with the addition of a sentinel fisherman program to address the edge effect of MPAs. The sentinel fisherman program would measure CPUE in, adjacent to and outside the reserves. Possible cost savings if combined with efforts recommended under the landscape topic in the intertidal monitoring group in the Ecological Monitoring Recommendations.

Frequency: 1-5 years
Duration: 12 months
Baseline Cost: $200,000-$360,000
Annual Cost: $180,000-$260,000

High (S1): This includes everything in the low and medium options plus extending data collection on catch and value of catch to the 1-minute by 1-minute spatial resolution as was done in the MRWG process.

Frequency: 1-5 years
Duration: 12 months
Baseline Cost: $550,000-$1,000,000
Annual Cost: $300,000-$500,000

Recreation Users (S2 and S3)

1. Use and Catch-Consumptive Users

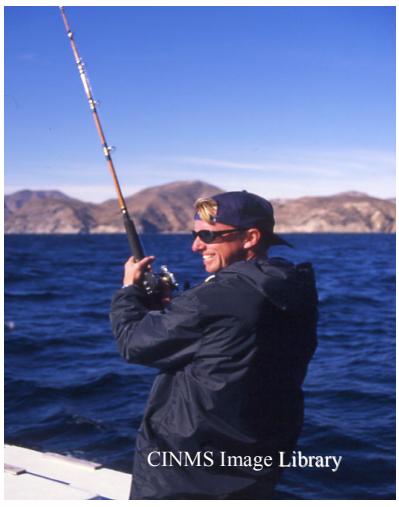
Low (S2_1): This option limits the scope of monitoring to the commercial passenger fishing vessels (CPFV) covered by the CDFG logbooks that fish in the CINMS. Surveys would be conducted of all the CPFV business operations with separate surveys of

passengers to get spending and socioeconomic profile information.

Frequency: Annual
Duration: 3 months
Baseline Cost: $10,000-$25,000
Annual Cost: $25,000-$50,000

Medium (S2_1): This option would expand the low option to include those that access the CINMS from private household boats. This would require a new survey effort. Stratified random samples could be drawn from State of California boat registration files and from Coast Guard registration files or agreements could be made with NMFS to expand their MRFSS survey by adding observations to sample sizes to get estimates of use in the CINMS and surrounding areas from access points in Santa Barbara, Ventura and Los Angeles counties.

Frequency: Annual
Duration: 12 months
Baseline Cost: $150,000-$250,000
Annual Cost: $150,000-$250,000



Angler in the Channel Islands National Marine Sanctuary

High (S2_1): This option would expand the medium option to include those that engage in consumptive diving – not adequately covered (small sample sizes) by CDFG logbooks for CPFV or by NMFS-MRFSS for either charter/party boats or private household boats. Here the new survey would use a replication of the survey done by Dr. Kolstad for the MRWG process on all charter/party boat operations and a new survey of private household boats to cover all recreational consumptive users.

Frequency: Annual
Duration: 12 months
Baseline Cost: $225,000-$350,000
Annual Cost: $225,000-$350,000

2. Edge Effects

Low (S2_2 and S2_3): This option could be combined with the low option on Catch and Use (S2_1) and limit the focus to CPFV.

Frequency: Annual
Duration: 3 months
Baseline Cost: $0 (see S2_1)
Annual Cost: $0 (see S2_1)

Medium (S2_2 and S2_3): This option requires that the medium option for Use and Catch (S2_1) be implemented. This option would not include consumptive diving.

Frequency: Annual
Duration: 12 months
Baseline Cost: $0 (see S2_1)
Annual Cost: $0 (see S2_1)

High (S2_2 and S2_3): This option requires that the high option for Use and Catch (S2_1) be implemented. This

option would then ensure that all consumptive user groups were included.

Frequency: Annual
Duration: 12 months
Baseline Cost: $0 (see S2_1)
Annual Cost: $0 (see S2_1)

NOTE: Under all three cost options, there may be some information that can be more efficiently obtained by combining efforts recommended under the landscape topic in the intertidal monitoring group in the Ecological Monitoring recommendations.

3. Knowledge, Perceptions and Attitudes: Consumptive and Nonconsumptive

Low (S2/3_1): This option limits the focus to CPFV and could be combined with the low option for Use and Catch (S2_1). New survey question layers could be added to both the surveys of CPFV business operations and to surveys of passengers. This would be done for the baseline and replicated every three years.

Frequency: 3 years
Duration: 3 months
Baseline Cost: $0 (see S2_1)
Annual Cost: $0 (see S2_1)

Medium (S2/3_1): This option requires that the medium option for Use and Catch (S2_1) be implemented. New survey question layers could be added to survey of charter/party operations and for survey of private household boats in NMFS-MRFSS. This would be done for the baseline and replicated every three years.

Frequency: 3 years
Duration: 12 months
Baseline Cost: $0 (see S2_1)
Annual Cost: $0 (see S2_1)

High (S2/3_1): This option requires that the high option for Use and Catch (S2_1) be implemented. New survey question layers could be added to the survey of all charter/party boats owners/operators and for the surveys for those that access the CINMS with private household boats. This would be needed for the baseline and should be replicated every three years.

Frequency: 3 years
Duration: 12 months
Baseline Cost: $0 (see S2_1)
Annual Cost: $0 (see S2_1)

4. Uses and Economic Value of Reserves – Nonconsumptive Recreation Users

Low (S3_1, S3_2 and S3_3): This option limits monitoring to the charter/party/guide services (for hire operations) and their customers (recreation users). The data collection done by Dr. Kolstad for the MRWG process could be replicated to get use (measured in person-days) spatially (1-minute by 1-minute resolution) both inside and outside reserves. A new survey could also be done on the passengers of the operations to get estimates of their willingness to pay for marine protected areas versus areas outside the reserves. As in the MRWG process, cost and earnings of the operations could also be obtained and spending profiles could be added to the passenger surveys to estimate market economic impacts (e.g., sales/output,

income and employment) on local and regional economies.

Frequency: Annual
Duration: 3-12 months
Baseline Cost: $10,000-$25,000
Annual Cost: $25,000-$35,000

Divers in Kelp Bed within the Channel Islands National Marine Sanctuary

Medium (S3_1, S3_2 and S3_3): This option requires that the high option for S2_1 be implemented. This would include a survey of private household boats and would obtain information on use for both Consumptive and Nonconsumptive recreation from private household boats. Survey data layers could also then be added to address willingness to pay for use in marine protected areas versus areas outside the reserves. As with the low option, additional information would be obtained from the charter/party/guide services and private household boat users on market economic impacts. This effort would require first establishing the baseline with replication every year.

Frequency: Annual
Duration: 12 months
Baseline Cost: $10,000-$25,000
Annual Cost: $25,000-$50,000

High (S3_1, S3_2, and S3_3): Same as medium option.

NOTE: The low costs of these three options are contingent on combining efforts with consumptive users (S2_1)

5. Option/Nonuse Values of Consumptive Users of Reserves

Low (S2_4): This option is limited to application to the for hire industry (charter/party boats and guide services) passengers. A new survey of the for-hire industry passengers will be required. This survey could be combined with the low option for Use, Catch – Consumptive Users (S2_1). Due to complexity in survey design, baseline costs are relatively high.

Frequency: 3 years
Duration: 2 years
Baseline Cost: $100,000-$150,000
Annual Cost: $25,000-$50,000

Medium (S2_4): This option would expand the scope to include those that access the CINMS from private household boats. This could be done by adding this survey layer to samples taken under the medium or high options for Use and Catch – Consumptive Users (S2_1). This could also be done through add-on surveys to NMFS-MRFSS or a new survey from State of California and Coast Guard boat registration files. Due to complexity in survey design, baseline costs are relatively high.

Frequency: 3 years
Duration: 2 years
Baseline Cost: $100,000-$150,000
Annual Cost: $50,000-$100,000

High (S2_4): This option would expand the scope to include the general population of the U.S. This would

include doing everything in the medium option plus a new national sample. It might be possible to combine this effort with the high option for Value of Reserves to Nonusers (S4_1 and S4_2), but complexity of each of these surveys might require separate samples. Due to complexity in survey design, baseline costs are relatively high.

Frequency: 3 years
Duration: 2 years
Baseline Cost: $100,000-$150,000
Annual Cost: $100,000-$200,000

NOTE: If able to combine efforts with surveys of nonusers, these costs could be lowered significantly

Recreation Users – sub-total:

Low (S2 and S3): This option would limit monitoring to the for hire industry (charter/party boats and guide services). Surveys would be conducted of the owner/operators (annually) and passengers (seasonally). Surveys of owner/operators would obtain information on use (person-days) and its distribution at the 1-minute by 1-minute of resolution used in the MRWG process. These surveys would also include information on costs and earnings and knowledge, attitudes and perception of management strategies and regulations. Surveys of passengers (the recreational users) would include socioeconomic profiles; spending profiles; knowledge, attitudes and perceptions of management strategies and regulations; for consumptive users, information on edge effects and option/nonuse values for access to MPAs; and for nonconsumptive users, economic values of MPAs.

Frequency: 1-3 years
Duration: 3-12 months
Baseline Cost: $120,000-$200,000
Annual Cost: $75,000-$150,000

Medium (S2 and S3): This option would expand the effort to include those that access the CINMS by private household boats. This effort would require a new survey of boaters from the State of California and Coast Guard boat registration files.

Frequency: 1-3 years
Duration: 1-2 years*
Baseline Cost: $260,000-$425,000
Annual Cost: $250,000-$450,000

High (S2 and S3): This option would include selecting the high options for all S2 and S3 recommendations.

Frequency: 1-3 years
Duration: 1-2 years*
Baseline Cost: $335,000-$525,000
Annual Cost: $325,000-$550,000

**NOTE: 2 years required for initial survey design for option/nonuse values for users.*

Nonusers – Passive Economic Use Values (S4)

1. Value of Reserves to Nonusers

Low (S4_1 and S4_2): This option requires that the high option for S2_1 and the medium/high option for S3_1, S3_2, and S3_3 be implemented so surveys of nonusers could be combined with surveys of non-consumptive recreation users. This would limit the extent of nonusers to a smaller population of nonusers (boating

population). This option would also limit the scope geographically to those boaters living in Santa Barbara, Ventura and Los Angeles counties. Due to complexity in survey design, baseline costs are relatively high.

Frequency: 3 years
Duration: 2 years
Baseline Cost: $100,000-$150,000
Annual Cost: $25,000-$50,000

Medium (S4_1 and S4_2): This option adds to the low option by expanding the geographic scope to the population of boaters living in California beyond Santa Barbara, Ventura and Los Angeles counties. Due to complexity in survey design, baseline costs are relatively high.

Frequency: 3 years
Duration: 2 years
Baseline Cost: $100,000-$150,000
Annual Cost: $50,000-$100,000

High (S4_1 and S4_2): This option adds to the medium option by expanding scope to the general population of the U.S. This would require a new survey sample design, which would not allow for combining with other recreation surveys to save on costs. Due to complexity in survey design, baseline costs are relatively high.

Frequency: 3 years
Duration: 2 years
Baseline Cost: $100,000-$150,000
Annual Cost: $100,000-$200,000

Education, Research and Outreach (J1)

1. Education Values

Low (J1_1): This option tracks the number of educators and numbers of participants in education programs relating to the MPAs as an indicator of the education value of MPAs. This would require new surveys or other methods to compile the information. Baseline needs to be established with annual replication.

Frequency: Annual
Duration: 12 months
Baseline Cost: $10,000-$25,000
Annual Cost: $10,000-$25,000

Medium (J1_1): Same as low option.

High (J1_1): This option would add surveys of educators and education programs for breakdowns on research expenditures and where funds are spent to estimate economic impacts on local, regional and national economies.

Frequency: Annual
Duration: 12 months
Baseline Cost: $50,000-$100,000
Annual Cost: $50,000-$100,000

2. Scientific Values

Low (J1_2): This effort requires setting up a research permit tracking database. Permits and research funding related to research on MPAs would be used as indicators of the scientific values of MPAs. Costs would be related to initial database creation with existing agency staff used to keep database updated and produce annual reports. Initial cost of database $1,000 - $10,000.

Frequency: Annual
Duration: 12 months
Baseline Cost: $1,000-$10,000
Annual Cost: $0*

**NOTE: Uses existing agency staff*

Scientific Field Research within the CINMS (photo: Brad Doane)

Medium (J1_2 and J1_3): In addition to the database on permitted research, this option would add efforts to capture other research on the MPAs not captured by the permit system. New data collection would involve use of Web sites, informal contact with scientific community and/or symposiums to get information on the number of research projects and amount of research funds devoted to marine protected areas.

Frequency: Annual
Duration: 12 months
Baseline Cost: $11,000-$40,000
Annual Cost: $10,000-$30,000

High (J1_2 and J1_3): In addition to the tasks in the low and medium options, this option would include a survey of researchers to get breakdowns on research costs and where spent to estimate economic impacts in the local, regional or national economies.

Frequency: Annual
Duration: 12 months
Baseline Cost: $51,000-$110,000
Annual Cost: $50,000-$100,000

3. Public Outreach

Low (J1_4): This effort would communicate results of both the ecological and socioeconomic monitoring programs using existing public outreach staff resources and means of communication.

Frequency: Annual
Duration: 12 months
Baseline Cost: $0*
Annual Cost: $0*

**NOTE: Uses existing agency staff*

Medium (J1_4): Same as low option.

High (J1_4): Same as low option.

Education, Research and Outreach – sub-total:

Low (J1): This option tracks the number of educators and numbers of participants in education programs relating to MPAs using new surveys; sets up a research permit tracking database to track the number of research projects and research funds devoted to MPAs; and uses agency education and outreach programs to communicate the results of the ecological and socioeconomic monitoring programs.

Frequency: Annual
Duration: 12 months
Baseline Cost: $11,000-$35,000
Annual Cost: $10,000-$25,000

Medium (J1): This option expands on the low option by expanding the permit tracking database to include scientific

research on MPAs not captured by the permit system.

Frequency: Annual
Duration: 12 months
Baseline Cost: $21,000-$65,000
Annual Cost: $20,000-$55,000

High (J1): This option expands on the low and medium options by including new surveys of researchers to get breakdowns of their research budgets and where the money was spent to support estimation of economic impacts of research in local, regional and national economies.

Frequency: Annual
Duration: 12 months
Baseline Cost: $101,000-$210,000
Annual Cost: $100,000-$200,000

Total Costs- All Socioeconomic Monitoring:

Low: $260,000 - $490,000
Medium: $570,000 - $1,070,000
High: $895,000 - $1,555,000

Commercial Fishing

Monitoring Recommendations

Commercial Fishing: S1_1

Question/Topic/Goal and Objective:
Do impacts financially harm individual businesses? Do impacts financially harm local and/or regional economies?
Monitor Use, Catch, and Value by analyzing existing data and collecting new data at 10x10 scale

Baseline Measurement(s):
We currently have catch and ex vessel value of catch (what the fishermen receive for catch) from the California Department of Fish and Game (CDFG) fish ticket system. Data is organized in 10-minute by 10-minute blocks (100 nautical square miles). We currently have data for years 1988-2000. Catch and ex vessel value is available by fisherman, species, gear, and port where landed. Information is organized into 27 species groups, 14 of which account for over 99 percent of the ex vessel value of catch from the CINMS.

1)Market Squid
2)Kelp
3)Urchins
4)Spiny Lobster
5)Prawn
6)Rockfishes
7)Flatfishes
8)Sea Cucumbers
9)Wetfish (anchovies, sardines, and mackerel)
10)Crabs
11)California Sheephead
12)Sculpin & Bass
13)Tuna
14)Shark

Monitoring Activity:
Compile and analyze data on the following: species groups (need to fine tune list of 14 species - take sea bass out of 12 and make separate; make halibut separate from 7, and add salmon), gear, port, region, vessel size, portfolio effect (this refers to multi-fishery fishermen), market availability and price. These data need to be correlated with environmental information (from fishermen's knowledge and biological monitoring) and regulatory changes. From all of this, we want to establish baseline data, and track changes after MPAs go into effect. The data should be available in a database that can be queried to analyze a variety of relationships among the different data sets, and all data should be geo-referenced (for GIS). Each dataset should be as complete as possible - back as far as agency has been collecting data. One can then connect this information to the Fishery Economic Assessment Model (FEAM) to estimate economic impacts on local and regional economies.

Justification:
This is the most important and only basic information that needs to be established and collected annually to assess effects of MPAs at a large scale.
These data are necessary to track regional trends and effects, separate from local events.
This is extremely useful information that can be obtained at a minimal cost.

Data Collected:
All of the data are collected routinely by a variety of agencies already. This monitoring initiative involves compiling and analyzing these data. Before this can be done there must to be a system created which accommodates confidentiality issues relating to fishermen's proprietary knowledge, if these data include any higher resolution than 10 x 10 mile. Steps include: designing protocol, for confidentiality issues, making arrangements with various agencies to transfer datasets to this project director's office on a regular basis, performing analyses, preparing reports to disseminate results.

Timing:
Estimated 1 month to get data transfer and analysis mechanism up and running (2 weeks to get data from CDFG for example, and 2 weeks to process), then 1 month per year to create annual report. One month to collect the data. Data collected annually.

Spatial Resolution/Scope:
10x10 minute blocks

Cost:
Low: $1,000 - $10,000
Medium: $50,000 - $60,000

Staff:
<1 FTE.
Only requires a full time employee for approx. 1 month per year. Confidentiality needs to be ensured through data encryption to ensure confidentiality. It is imperative that this employee be skilled in statistical analysis, and has experience in writing computer code to analyze data such as in SAS and SPSS. Employee also needs to be skilled in GIS (ArcView is the standard).

Funding Sources:
In addition to CINMS and CDFG; PSMFC, Saltonstall-Kennedy, SeaGrant, Fishing Organizations

Commercial Fishing: S1_2

Question/Topic/Goal and Objective:
Do impacts financially harm individual businesses? Do impacts financially harm local and/or regional economies? Are there broader community and social implications?
Monitor Use, Catch, and Value using new data collected at the 1x1 scale
This recommendation monitors use, catch, and value at a finer measurement scale of 1x1 mi. Utilizing a finer scale of measurement will provide a detailed, fishery specific measurement of change in fishing activities and can better capture their social and economic consequences.

Baseline Measurement(s):
We have Catch and Ex Vessel Value of Catch for 1999 in 1-minute by 1-minute cells (1 nautical square mile) for the following species groups:

1)Market Squid
2)Kelp
3)Urchins
4)Spiny Lobster
5)Prawn
6)Rockfishes
7)Flatfishes
8)Sea Cucumbers
9)Wetfish (anchovies, sardines, and mackerel)
10)Crabs
11)California Sheephead
12)Sculpin & Bass
13)Tuna
14)Shark

NOTE: These 13 fish species (not including kelp) made up over 99 percent of the ex vessel value of the 1999 CINMS commercial catch. If spatial distributions are to be monitored at the 1-minute by 1-minute level of spatial resolution, then better baseline data would be required.

Monitoring Activity:
Due to weak baseline data available for some fisheries at this resolution, this recommendation will entail the collection of new data as well as analysis of these data. CDFG trip ticket data will have to be collected using 1-minute by 1-minute blocks.

Justification:
There is a critical lack of comprehensive, relevant social and economic data for most fisheries. These data are necessary to fulfill the socio-economic goals and objectives specified by the MRWG and the SAC and approved by the Fish and Game Commission. The data also help fulfill some regulatory requirements for future regulations. In contrast to biological research at the Islands, little social science research has been done. There is a cumulative, 25-year record of biological research; social science research has only recently begun, and has been piecemeal and insufficient. Moreover, there is a critical lack of infrastructure to support the needed social science research and its meaningful integration into the management and policy processes.

Data Collected:
1. Establish fishermen's data committees to collaboratively develop infrastructure for collaborative fisheries research including tools, methods and protocols.

2. Extract relevant baseline data (at 10x10 scale) and synthesize other quantitative and qualitative data.
3. Use ethnography to collect and analyze local knowledge (e.g., fishermen's experiential knowledge), including interpretation of logbook and other existing data.
4. Train fishermen and scientists in the use of on-the-water data collection technology.
5. Determine gaps in social and economic baseline data and conduct surveys and/or ethnographic research to fill those gaps.
6. Use rapid assessment or other techniques to map social and economic networks.
7. Analyze data to determine the spatial and temporal distribution of positive and negative impacts on commercial fisheries and associated communities.

Timing:
The initial collection of data and establishment of a relevant baseline will require an estimated 36 months, after which annual reporting will follow into the future.

Spatial Resolution/Scope:
1x1 minute blocks - at a minimum, in some cases the resolution may need to be finer.

Cost:
$300,000 - $500,000

Staff:
8 FTEs, 1 Volunteer.
Potential community members and/or student interns (only if well trained, carefully supervised and approved by fishermen's data committee). Fishermen's time and input (partially compensated, partially donated).

Funding Sources:
In addition to CINMS and CDFG; PMCC/IFR collaborative research program; PSMFC collaborative research RFP; Saltonstall-Kennedy Grant Program; Packard Foundation (?) and other foundations; Sea Grant; Fishing associations; EDD grants for skills development/technical training.

Commercial Fishing: S1_3

Question/Topic/Goal and Objective:
The following questions will be addressed through monitoring for the existence/implications of an edge effect:
1. Are people fishing the boundary or 'edge' of a reserve and what are they fishing for?
2. Is there crowding on the edge of the reserve?
3. What are the economic benefits and/or costs of fishing the edge of the reserve?
Key to answering these questions is identifying what is considered the 'edge' of a reserve (i.e., 200 feet of the regulatory boundary is considered fishing the edge of the reserve). Fishing the edge of the reserve may be different depending on the fishery and the individual reserve.

Baseline Measurement(s):
Distribution of catch by block and species group where caught and port where landed is available for 1999. This initial measurement can be updated using CDFG trip ticket data.

Monitoring Activity:
The monitoring for edge effect will require collection of new data using the methods employed in 1999 to organize data by distribution of catch by block and species group where caught and port where landed. Explore use of CINMS SAMSAP.

Justification:
Measuring the amount of people/boats fishing the edge of the MPA will address whether fishing is occurring on the edge of the reserve, what fisheries are taking place at the edge of the reserve, and whether there are any economic costs or benefits to fishing the edge. Information gathered on fishing the edge of the reserve can be used in conjunction with other monitoring programs (basic consolidation of landings information) to look at possible small-scale displacement of individuals from traditional fishing areas.

Fishing on the edge of a reserve may also be perceived as the best place to fish, but it may not be any more economically beneficial than other areas. It is important to measure activity as a response to a perception. This perception may change with the length of time the reserves are in place. It is also possible that in time the real benefits and/or costs to fishing the edge of the reserve will change.

Understanding conflicts among industry participants as well as between industry and recreational users is important to monitoring the cultural impacts of MPA implementation.

Data Collected:
To answer the question: Are people fishing the line and is there crowding on the edge of the reserve?
1. Some information may be available through logbooks.
2. Observational data collected at each reserve (aerial photographs).
3. Individual interviews of the perception of whether crowding is occurring and whether fishing the edge of the reserve is increasing or decreasing revenue. Economic return

and/or cost associated with fishing the edge of a reserve: This question may be addressed through a sentinel program that allows fishing inside the reserve, at the edge of the reserve and outside the reserve in a control area to establish catch per unit effort (CPUE). Individual landing information would complement this program.

Timing:
5 months from collection to product. Data collection ongoing

Spatial Resolution/Scope:
1X1 nm

Cost:
>$100,000

Staff:
2 Full Time Employees, could be volunteers
Any interviewers would need approval by industry participants. Volunteers may be graduate students. On the water observations would require the use of a vessel and the associated costs as well as knowledgeable personnel to identify different types of fishing activity.

Funding Sources:
In addition to CINMS and CDFG, Sea Grant, and Saltonstall – Kennedy,
Department and Sanctuary vessels may be available for use.

Commercial Fishing: S1_4

Question/Topic/Goal and Objective:
Do impacts financially harm individual businesses? Do impacts financially harm local and/or regional economies? Are there broader community and social implications? Are there needs for compensation or assistance programs?
Displacement
This monitoring proposal will measure the size and extent of displacement on:
-Where vessels and people have gone
-Substitution to other non-fishing income activities (i.e. capacity reduction),
-Impacts on other fisheries
-Other areas.
The intent of monitoring is to distinguish between direct effects (people leaving) and indirect effects (other areas/people who are impacted; congestion)

Baseline Measurement(s):
There is an Economic Impact Model, which exists as an Excel file containing connected worksheets. This model includes multipliers that translate ex vessel value of catch by species group and port where landed into income generated in the county where the port of landing is located. The multipliers are from the Pacific Fishery Management Council's Fishery Economic Assessment Model (FEAM). This model gives a reasonably good estimate of the economic impact in the local county economies and one could use this model to assess the impact of displacement.

Monitoring Activity:
In order to monitor for displacement new data must be collected and analyzed.

Justification:
To better assess how area-based management affects fishermen, industry, and the coast as a whole. This monitoring initiative will provide a necessary step to fulfill regulatory obligations, help avoid future lawsuits (National Standard 8), and to fill critical socioeconomic data gaps for marine and fishery management.

Data Collected:
Use past landing records to design sample/panel of fishermen to compare to those who used to fish inside CINMS (e.g. similar proportion, composition of landings), We can then track changes in spatial behavior using logbooks/fish landing receipts. regional stratification may depend on species; add interview layer to elicit reasons for movement; historical data from panel for underlying trends in spatial behavior; draw on CDFG analysis done for restricted access programs, for fisheries profiles/characterizations (contact Mike Weber, RATP);

Timing:
12 months from collection to compilation
Ongoing surveys thereafter

Spatial Resolution/Scope:
Will Vary

Cost:
Low: $0
Medium: $50,000 - $100,000
High: $50,000 - $100,000

Staff:
2 Full Time Employees, Need fulltime supervisor/PI
Could use volunteers (i.e. using fishermen who consent to be on study panels), however, the confidentiality issue needs to be resolved (socioeconomic study wide);
May be able to rely on existing marine research, institutes, outreach and educational activities for additional information.

Funding Sources:
Funding efforts could be undertaken as a collaboration with the MLPA process b/c regional working groups structure, protocol, and data availability are potentially helpful; leverage for SK funding, as model for assessing reserve impacts on different fisheries; leveraging for PacFIN data enhancement work, Pacific States

Commercial Fishing: S1_5

Question/Topic/Goal and Objective:
Do impacts financially harm individual businesses? Are there broader community and social implications? Are the MPAs working?
Surveying commercial fishermen on knowledge, perceptions and attitudes, over time, related to MPAs in CINMS

Baseline Measurement(s):
From the Pomeroy study and an ethnographic data study done by Kronman and others, we have some, but limited information on fishermen's knowledge, attitudes and perceptions of management strategies and regulations. Especially with respect to the current proposed set of MPAs.
NOTE: Some other research may have been underway, but not available to the Socioeconomic Panel for the CINMS Marine Protected Areas. There is a need to update what we know. For monitoring purposes, we consider this a major gap.

Monitoring Activity:
Designing a survey (list of questions) to be administered to fishermen every year. This should be coordinated with fishermen's panels and other panels (biologic and social). Primarily new data collection, with minimal use of existing data and some analysis.

Justification:
This initiative will provide important feedback to management including revelation of misinformation, to determine from where users obtain information, the levels of awareness and understanding, needs for outreach, education and adaptive management, public response to the MRWG, goals/objectives, important feedback to wider fishery management, development of the necessary relationships for data acquisition for users, the hypothesis-driven, defensible research.

Data Collected:
-Information must be gathered on Knowledge, Attitudes, and Perceptions, Profiles of Users, Effects of other regulations and management strategies on users, and spatial distributions of measurements.
-A possible approach could be to incorporate minimal old data mining? One could employ the baseline data through the MMS study, Wetfish report, SEA Grant study,
-Squid, Salmon Fishermen should be included
-Could use a panel approach or focus groups (periodic) as well as ethnography (interviews) to identify issues and concerns that need to be addressed
-Solid survey techniques must be employed to ensure the questionnaire design uses good stratified random samples for producing measurements to compare over time
-Include other stakeholders engaged in fishing industries (i.e. wetfish buyers)
-Possibly develop 2 separate panels – one for fishermen and another for fishing dependent businesses

Timing:
Varies by tool, estimated 15-18 months from collection to compilation
Survey every 3 years (ethnographic)
*Make sure that we can use this comparatively with other user groups/panels

Spatial Resolution/Scope:
The surveys should stretch from Monterey Bay to San Diego
However, in an ideal situation we would like to see the surveys enacted fishery-wide

Cost:
Low: $5,000
Medium: $50,000 - $100,000
High: $50,000 - $100,000

Staff:
There is inadequate staff within agency
Panel needs to be developed
3 Full Time Employees to design tool

Funding Sources:
NOAA (need some social scientists), Private Foundations, California Department of Fish and Game

Commercial Fishing: S1_6

Question/Topic/Goal and Objective:
Who are the fishermen? Who, among commercial fishermen, are impacted by MPAs? A stratified random sample of fishermen fishing in the CINMS as defined by the 22-CDFG blocks used in Leeworthy and Wiley (2002). Obtain Socioeconomic profiles to track whether commercial fishing panels are representative of commercial fishing population. Need baseline.

Baseline Measurement(s):
We have profiles from three sources. The first was a sample of Tri-County fishermen (fishermen living in San Luis Obispo, Santa Barbara, and Ventura counties) and a sub-sample of these that fished in the Channel Islands. This was from a study by University of Nevada researchers on a project funded by the Department of the Interior's Minerals Management Service. NOAA hired Dr. Caroline Pomeroy who surveyed a sample of squid/wetfish fishermen and Dr. Craig Barilotti that surveyed a sample of all other commercial fishermen (other than squid/wetfish fishermen). The samples were good for capturing the majority of catch and value of catch, but are not representative of all fishermen.

We know very little about "marginal fishermen", i.e., those fishermen that rely for only a small amount of their incomes from commercial fishing catch. Nineteen (19) percent of the fishermen in the CINMS accounted for 82 percent of the value of catch in 1999.

NOTE: Given the new rules for accessing CDFG data, it may be possible to design "representative samples" of fishermen for monitoring.

Monitoring Activity:
collecting new data

Justification:
This general survey sample of commercial fishermen fishing in the CINMS is necessary to check whether the commercial fishing panels are representative of the commercial fishermen population. It will provide the necessary information needed to adjust panels over time. This information also provides the basis on conducting assessments of the need for compensation or assistance programs.

Data Collected:
Socioeconomic Profiles of Commercial Fishermen that fish in CINMS:
1. Stratified random sample of all CINMS fishermen, stratified by type of fishery and extent of catch.
2. Socioeconomic variables to use include:
Catch, Value of Catch (ex vessel), Species/Species Groups, Age, Race/Ethnicity, Experience (years of fishing and years of fishing in CINMS), Education (years of schooling), Dependency on fishing (percent of Income from fishing), Percent of Revenue from fishing from CINMS by Species/Species Group, People directly employed and

family members supported, Ownership/Investment (replacement value of boats and equipment), Residence (home city and state), and Main Port where land catch.

Timing:
6 months from collection to product
Once every five years

Spatial Resolution/Scope:
22-block definition of CINMS

Cost:
Low: $0 if done as part of S1_2, the high option for use, catch, and value.
Medium/High: If low or medium option chosen for use, catch, and value (S1_1), then $50,000 - $100,000. Baseline and replication every 5 years.

Staff:
2 Full Time Employees (4 people for 6 months), could be volunteers
Any interviewers would need approval by industry participants. Volunteers may be graduate students.

Funding Sources:
CINMS and/or CDFG
Sea Grant
Saltonstall – Kennedy

Recreation Monitoring Recommendations

Recreation: Consumptive – S2_1

Question/Topic/Goal and Objective:
How does consumptive recreational boater activities, including use and catch patterns (e.g. effort, location, mix of kept/release), change over time with respect to loss of access, biological changes and consequences, availability/attractiveness of alternatives, long-term benefits and costs, socioeconomic and demographic changes, and management changes compared to the baseline without reserves?
Use and Catch

Baseline Measurement(s):
There are several potential sources of baseline information for this monitoring activity. The first is the California Department of Fish and Game (CDFG), Commercial Passenger Fishing Vessel (CPFV) Logbook Data. These data include information on location (CDFG block), length of fishing trip (angler hours), number of anglers, port, species, number landed of species, target species, and fishing method. This is a reasonable source for CPFV data, however at the geographic resolution of block group, it will not be helpful in tracking changes in use and catch patterns for any individual MPA. Furthermore, it does not include any data on private boat usage and catch.

Another source is the Marine Recreational Fishery Statistics Survey (MRFSS). While these data contain a wealth of information, including; angler data, trip data, and catch data (both available and unavailable (e.g. catch and release)), only a sub sample of the data is geo-referenced. This sub sample has not been historically able to cover an area the size of the Channel Islands National Marine Sanctuary (CINMS) with sufficient resolution to meet the needs of the marine protected areas process. CINMS and CDFG could partner with NMFS-MRFSS and expand sample sizes for CINMS and surrounding area.

The final source of data is that collected as part of the Marine Reserves Working Group (MRWG) process. These data represent a census of the CPFV operations in the study area and also include data on private boat users. The data are at a sufficient resolution (one by one minute) to track changes in individual reserves. However there appear to be shortcomings of these data. Only one year (1999) is represented, and thus the possibility of 1999 being an anomalous year is not accounted for. Additionally, there are no means to determine whether any changes in the industry since 1999 have occurred, and what the reasons for these changes are. Moreover, these data include only information on CPFV operations and general patterns of private boat usage – not on individual anglers.

Monitoring Activity:
Compiling existing and collecting new data.
See Bennett study of log book data.

Justification:
We need to know how consumptive recreational boater activities have changed to

understand the benefits and impacts of MPAs.

Data Collected:
On-site interviews (including detailed location information) should be conducted and there is a need to incorporate a sampling of private access boats. Off-site sampling (surveys/interviews (phone, mail, with license sale) will determine the proportion of population captured in the onsite interviews and characteristics. Sample of private household boats could be drawn from State of California and Coast Guard boat registration files. Aerial surveys (e.g. number, activity (including type of vessel) around Channel Islands). Volunteers: senior volunteers, recreational fishermen, clubs/tournaments. Must incorporate latest technology - GPS, data loggers.

Timing:
3 months from data collection to product
The frequency of data collection could range from daily to biannual or longer

Spatial Resolution/Scope:
1X1 nm

Cost:
Low: $25,000 - $50,000
Medium: $150,000 - $250,000
High: $225,000 - $350,000

Staff:
5 Full Time Employees, could be volunteers
Volunteers would be used to obtain use and catch information as described earlier. Volunteers would require extensive training and oversight due to data sensitivity and proprietary information. A caveat to using club/tournament volunteers is that they may provide non-random sampling information with potential bias.

Funding Sources:
Federal (CINMS, NMFS-MRFSS); State (CDFG); In-kind services; NGO

Recreation: Consumptive – S2_2

Question/Topic/Goal and Objective:
Are recreational consumptive users able to mitigate short-term costs of displacement from MPAs by conducting activities along the edge of the MPAs? Will there be long-term benefits from edge effects?
Are there benefits to the edge in size and/or replenishment?
Use and Catch - Edge Effects
Separate edge effect from other fishery management activities.

Baseline Measurement(s):
Of the sources of data mentioned above as part of the *Use and Catch* topic, the only possible source of baseline data that would be applicable to this topic is the data collected as part of the MRWG process. The same shortcomings mentioned above apply, namely that only one year (1999) is represented, there are no means to determine the extent of any changes in the industry since 1999 and what the reasons for these changes are. These data only include information on CPFV operations and general patterns of private boat usage – not on individual anglers. The estimates of private boat usage are most likely not accurate enough to serve as an adequate baseline for monitoring.

Another potential source of baseline data for this topic is the Sanctuary Aerial Monitoring Spatial Analysis Program (SAMSAP). These data are gathered from aircraft and include observations on types of boats observed and activities in which boaters are engaging in, for cases where it is apparent from the air (e.g. fishing).

There is no existing institution that covers consumptive diving. Baseline here is not adequate for monitoring

Monitoring Activity:
Would include data collection and the institution of a tagging program, sample fishing program, and surveys

Justification:
Can't understand the benefits and impacts without measuring this use.

Data Collected:
Type of data collection

- New data collection, primarily survey data, for incorporation into new improved MRFSS and other state data on the number, size, length, weight, GPS location of fishing activities
- Cooperative professional recreational sustainable fishery organizers can lead special data collection efforts from recreational community.
- Tagging programs for monitoring catch and release.
- Possible reinterpretation of existing fishing data (tournaments) e.g. marlin,
- For consumptive divers, a new survey, separate from MRFSS would be

required. Could possibly survey from state of California's boat registration file or from various access points (ports, harbors, boat ramps, marinas)

Type of information

- Profiles of users/recreational activity, geographical location, # of people, catch details, time spent, CPUE, size, demographics, quality of the experience, season, expenditures

How to obtain measurement

- Select group of recreational fishermen
- GPS handhelds
- Palm pilots
- Measuring tape
- Scales
- Release tools
- Training by private/public coalition

Timing:

7 year project. Year 0 important now. Align frequency with biological surveys as this is an activity that lends to collaboration between socioeconomic and biological monitoring programs.

Spatial Resolution/Scope:

As fine as can be reported (but should not become an enforcement tool)
Broad reaching throughout CINMS region to create momentum to potentially spread to other sanctuaries.

Cost:

Training recreational fishery coordinators, Kits, Stipends. See Summary Recommendations for explanation of costs.
Low: $0
Medium: $0
High: $0

Staff:

Data collection/analysis expert, Paraprofessional organizers from recreational community, Volunteer efforts.

Funding Sources:

SFRA Funds
Sustainable fishery organizer grants
CINMS and CDFG along with NMFS-MRFSS.
CA Department of Boating and Waterways.

Recreation: Consumptive – S2_3

Question/Topic/Goal and Objective:
Are recreational consumptive users able to mitigate short-term costs of displacement from MPAs by conducting activities along the edge of the MPAs? Will there be long-term benefits from edge effects?
Are there benefits to the 'edge' in size and/or replenishment?
Edge Effects
Monitor edge effects (spatial distribution) for private and for-hire boats, both angling and diving consumptive users.

Baseline Measurement(s):
Of the sources of data mentioned above as part of the *Use and Catch* topic, the only possible source of baseline data that would be applicable to this topic is the data collected as part of the MRWG process. The same shortcomings mentioned above apply, namely that only one year (1999) is represented, there are no means to determine the extent of any changes in the industry since 1999 and what the reasons for these changes are. These data only include information on CPFV operations and general patterns of private boat usage – not on individual anglers.

Another potential source of baseline data for this topic is the Sanctuary Aerial Monitoring Spatial Analysis Program (SAMSAP). These data are gathered from aircraft and include observations on types of boats observed and activities in which boaters are engaging in, for cases where it is apparent from the air (e.g. fishing).

Monitoring Activity:
New data collection

Justification:
To measure potential congestive edge effects of each reserve site. Replicated every few years to measure serial changes.

Data Collected:
Observers on-board charters including dive boats with GPS.
Dockside interviews with private boats at public access sites with detailed maps.
Interviews of 'private access' private boats by intercept, water (boat) or private access marina based observers, both with detailed maps.
Island land based, (or aerial, less desirable) surveys of distribution of vessels around the reserves
Observation only, no intercept, dawn to dusk usage patterns.
Collection of user phone numbers for follow-up economic issues.

Type of information: catch, value, activity, edge effect, profile of users, recreation/tourist spending, knowledge attitudes and perceptions, spatial distributions, cost and earnings, other regulations effect, oceanographic, weather, annual metadata.

Timing:
Fifteen months with a replication period of three years.

Spatial Resolution/Scope:
1x1 minute resolution

Cost:
$300,000

Staff:
Three FTEs and one volunteer. 10 volunteers for observers on board charters and for intercepting boats in harbors and ramps. 2 FTE for 4 months of island observations and 8 months of data processing. 1 FTE 12 months of volunteer coordinator and general oversight.

Funding Sources:
NOAA funded, CDFG funded, Congressional Line item, NPS funded, misc. grants? Need 100K/year sustained.

Recreation: Consumptive – S2_4

Question/Topic/Goal and Objective:
Do consumptive recreational users possess non-use values (option, existence, bequest) for consumptive activities in protected areas?
Non-Use values for consumptive recreational users

Baseline Measurement(s):
There is no current data available

Monitoring Activity:
New data collection

Justification:
There needs to be an estimation of non-use values that considers potential consumptive users. Non-users possess passive economic values, and the same may be said for consumptive recreational users. Consumptive activities have been pushed out of the protected areas within the Channel Islands, and these affected users value the alternatives for achieving resource protection without excluding consumptive recreational uses. It's important to understand that passive economic values exist on both sides of the equation both from users and non-users.

For instance, there are alternatives for achieving resource protection without excessively excluding opportunities for use. It is important to not include values derived from desires of the population for resource protection until such time it's established exactly what in regards to resource protection is unique to reserves. Conversely, it is also important to explore carefully different fishing uses. As we give more consideration to establishing parks like Yosemite in the Channel Islands, we need to understand what is compatible with achieving the goals of parks and what is not. Perhaps in such an environment the value of open recreational pelagic fishing or catch and release calico bass fishing will achieve a large percentage of the non-use values and use values and still achieve the lion-share of values derived for resource protection.

It is important to note that this recommendation is different from most other recommendations in that the value estimated here could be negative. Non-use values here are state dependent. If replenishment effects occur and overall the impact is to increase net benefits to recreational consumptive users, then there would be a negative willingness to pay for access to the closed areas that are creating the state of resources supporting the replenishment effect. Careful design of this research will be required.

Data Collected:
A non-use value survey will need to be developed to determine passive economic values for consumptive recreational users. It's crucially important in any non-use value survey to clearly differentiate between those desiring reserves or fishing opportunities and those desiring an alternative protection scheme for the islands or alternative opportunities.

This survey should be conducted in conjunction with the passive economic value survey established for non-users.

Timing:
In conjunction with non-user survey, initial survey will take an estimated two years to develop and should be conducted every three years

Spatial Resolution/Scope:
The scope should be the set of Channel Islands MPAs

Cost:
See summary of recommended costs

Staff:
1-2 FTEs in conjunction with non-user survey.
Volunteers could be trained to conduct survey interviews, and there are multiple NGOs and universities to pool volunteers from

Funding Sources:
Matching funds could be requested from private foundations, coastal communities, local businesses, etc. Cost-sharing by multiple agencies should be encouraged. Private donations/fundraiser events could help, too.

Recreation: Non-Consumptive – S3_1

Question/Topic/Goal and Objective:
What are the net benefits to Non-Consumptive users from the implementation of MPAs?
Use in Reserves
Economic Costs, earnings of non-consumptive recreational use of for hire operations.

Baseline Measurement(s):
There are two potential sources for data that may be used as a baseline for this topic. The first is the data gathered as part of the MRWG process. These data represent a census of the for hire operations in the study area. The data are at a sufficient resolution (one by one minute) to track changes in use inside the individual reserves. Shortcomings of these data include the following. The data do not include private boat non-consumptive users. Only one year (1999) is represented and thus the possibility of 1999 being an anomalous year is not accounted for. Additionally, there are no means to determine the extent of any changes in the industry since 1999 and what the reasons for these changes are. Moreover, these data only include information on the operations not on individual users.

Another potential source of baseline data is the SAMSAP data. However these data cannot be used to determine whether or not a recreational activity is consumptive or non-consumptive in cases where it is not obvious (e.g. diving).

Monitoring Activity:
New data collection

Justification:
For Hire Operators
1) What is the economic impact of reserves
2) SAC ranked this as a top priority
3) Must have these data to validate claims of impact
4) This will show the equity (share the pain) of impacts/benefits
5) To see the relative changes in non/consumptive uses and business
6) The correlation of health of ecosystem on these business operations
7) This is the pilot study for other proposals viability

Data Collected:
Monitor costs, earnings, and investments over time for recreational business use (the 51 users previously identified) of the for hire consumptive and non-consumptive groups. Determines an element of net national impact of reserves.

1) Representative panel surveys over time starting with the 1999 survey. Include logbook data for # passengers etc. to determine changes in customer base and operations. Note that other factors beyond MPAs must be considered for changes between 1999 and 2003.
2) Survey of new entrants and those who exit form this user group.
3) Track numbers of operators in the business by category over time.
4) Panel surveys of control populations up to 100 miles away.

5) Consider the use of electronic data gathering means, Personal Digital Assistants (PDA), GPS, and Computers with possible value added benefit to the user, i.e. fuel usage, catch, anglers, etc.

Timing:
Three months with annual period.

Spatial Resolution/Scope:
1x1 minute resolution

Cost:
$10,000 - $25,000
COST -(20K$ first year, 11K thereafter, software development, hardware costs unknown)
See Summary of Recommendation Costs.

Staff:
FTE = 3 person months for 51 interviews. Unknown amount of FTE for software development for PDA/Personal Computer functions. Confidential data needs to be collected by staff person, not volunteer.

Funding Sources:
Grants for economic impacts, local community, state, federal. SK grants, NPS monitoring budget, concession fees, NP entrance fees, NP enforcement fines.

Recreation: Non-Consumptive – S3_2

Question/Topic/Goal and Objective:
What are the net benefits to Non-Consumptive users from the implementation of MPAs? Use and Economic Value In Reserves

Baseline Measurement(s):
There are two potential sources for data that may be used as a baseline for this topic. The first is the data gathered as part of the MRWG process. These data represent a census of the for hire operations in the study area. The data are at a sufficient resolution (one by one minute) to track changes in use inside the individual reserves. Shortcomings of these data include the following. The data do not include private boat non-consumptive users. Only one year (1999) is represented and thus the possibility of 1999 being an anomalous year is not accounted for. Additionally, there are no means to determine the extent of any changes in the industry since 1999 and what the reasons for these changes are. Moreover, these data only include information on the operations not on individual users.

Another potential source of baseline data is the SAMSAP data. However these data cannot be used to determine whether or not a recreational activity is consumptive or non-consumptive in cases where it is not obvious (e.g. diving).

Monitoring Activity:
Collecting new data

Justification:
Non-consumptive users are key stakeholders in the CINMS and potentially major beneficiaries from the establishment of MPAs. Non-consumptive user activities have substantial socioeconomic impacts in the CINMS, and these economic benefits are expected to increase due to the establishment of MPAs. Over the long term, the economic benefits from non-consumptive users may exceed the existing benefits of some consumptive users, especially in light of the existing economic value of these activities and the underestimation of these benefits by the exclusion of private boat non-consumptive recreational users (as identified on page 13 of Leeworthy & Wiley, 2002). [NOTE: the exclusion of nonuse values may significantly underestimate the benefits of marine protected areas (see page 25 of socioeconomic monitoring handout)]This is particularly true for secondary economic benefits/multiplier effects to government and local economies of non-consumptive users, e.g. boat purchases, SCUBA gear, restaurant / hotel expenditures, etc. Therefore, the impact of the marine protected areas on the value of non-consumptive activities must have a well-established baseline and must be accurately monitored over time. This is necessary in order for management to make well-informed decisions for the benefit of all stakeholders. As part of this endeavor, it is important to identify the change in benefits to the different non-consumptive user groups, including skin/SCUBA divers, slip / private boaters, photographers, whale watchers, island visitors, snorkelers, etc. It is also important to monitor the change in value of each of these individual user groups due to implementation of MPAs.

Data Collected:
USE
1. For the charter/party/guide service sector, a replication of survey conducted by Dr. Kolstad in the MRWG process could be used. Annual Cost of $25,000 - $30,000
2. For private household boats, a new survey would be required. A stratified random sample of the state of California's boat registration file could be implemented. Face-to-face and in the home interviews would be conducted. Spatial use would be obtained using nautical charts and 1minute by 1minute grid cell overlays. Points of residence, access, and use would be included to support economic analyses.
VALUE
1. Identify / stratify non-consumptive user groups and prioritize user groups for data collection based on funding constraints.
2. Identify the study area (within the Sanctuary, areas inside and outside of MPAs, and outside the Sanctuary).
3. Design a contingent valuation survey to estimate the use and nonuse values to these users from the establishment of MPAs. The survey should include an estimation of willingness to pay (WTP) of the different non-consumptive user groups to utilize the MPAs
4. Follow established federal protocols (15 CFR Chapter IX, as further discussed in Mitchell & Carson, "Using Surveys to Value Public Goods: The Contingent Valuation Method").
5. Conduct in-person surveys of all users of charter boats/concessionaires, and then stratify by user group. Utilize a telephone survey methodology of non-consumptive users that do not utilize charter boat/concessionaires to reach the islands (private boats, stratified by distance of the boat slip to the islands).
6. Utilize/incorporate existing gray literature / data (such as dive logbooks from existing users such as the concessionaires
7. If possible, utilize non-profit organizations (such as Channelkeeper), graduate students, the Sanctuary's volunteer corps, etc. to implement the surveys.
8. Implement the survey on a seasonal basis in order to account for seasonal use variations.
9. Analyze results and publish/share results with decision makers, stakeholders, and the public. [NOTE: because charter boat/concessionaires take both consumptive and non-consumptive users to the CINMS, the survey activity of these two user groups should be coordinated in order to save costs.]

Timing:
Daily survey over 3-4 weeks each quarter

Spatial Resolution/Scope:
Doesn't address estimation of use, only use values

Cost:
See Summary of Recommendation Costs.

Staff:

0 Full Time Employees, could be volunteers
Sanctuary docents/volunteers, NGO volunteers, and students (at low cost) can help carry out the surveys.

Funding Sources:
NGOs and concessionaires could provide in-kind donations of travel to the islands. Local foundations could donate funds. Seek funding from the SB Chamber of Commerce (to accurately assess economic benefits).

Recreation: Non-Consumptive – S3_3

Question/Topic/Goal and Objective:
What are the net benefits to Non-Consumptive users from the implementation of MPAs?
Value of Reserves

Baseline Measurement(s):
No baseline information available

Monitoring Activity:
collecting new data

Justification:
*Assure that the benefits to non-consumptive users exist and quantify/describe those benefits.
*Non-consumptive benefits are a necessary element to Cost Benefit Analysis.
*It is essential to capture market and non-market value to know the positive economic impact to the user and community.
*To document change of perception and actions of users and non-users regarding marine protected areas over time.
*The value of non-consumptive users is rapidly approaching or has already exceeded that of consumptive users. Therefore it is imperative to give the non-consumptive users equal consideration. How to measure the value of stewardship/pride in the Channel Islands?

We feel that the value of non-consumptive use is just as valuable, if not more valuable, than the value of consumptive use.

Data Collected:
SURVEY: Utilize clubs/organizations & volunteers for in-person survey of users. In person surveying is best, though if there are constraints on this kind of survey, we need to be flexible and allow for other methods (phone; electronic (email/web) direct mail). In person surveys could take place on: charter, party, and concessionaire (IPCO) boats or at landings. Additionally, in person surveys could be implemented on-site using private and government vessels (CG, CDFG, CINMS, CINPS, Channelkeeper, and others). This could be a core opportunity for commercial fishers to become involved in the education and economic monitoring process. Docks, harbors, etc. are excellent examples of locations where trained surveyors and existing programs (i.e., Dock walkers) could be dispatched for gathering of data. Survey forms could be made available at a variety of locations: stores where fishing licenses are sold; dive shops where equipment is rented/sold and tanks are filled; boating supply store (West Marine, Chandlery, etc.); outdoor supply store, etc. These written surveys do not need to be as extensive/elaborate as the in-person surveys but certainly could assist in establishing use patterns and baseline data. Program surveyors will be trained using established protocols and methodology. We recognize that activities at the Channel Islands have seasonal variation and this needs to be taken into account when choosing when to survey and how frequently they are conducted. It is important to implement into this survey the changes

in use-patterns, which may accompany the establishment and growth of marine protected areas in the Channel Islands.

Timing:
12 months from collection to compilation
Annual surveys taking into account seasonal variations

Spatial Resolution/Scope:
N/A

Cost:
$40,000
See Summary of Recommendation Costs.

Staff:
1 Full Time Employee, could be volunteers
Potential sources of surveyors: NGOs, Naturalist Corps, CINMS, interns from UCSB/CSUCI/CSLB/SBCC/VC

Funding Sources:
Partial or matching funding could also be obtained from: NGOs; Chambers of Commerce; Local foundations. Match donations could take the form of: copy services; office supplies; transportation; people's time; advertising/marketing in local papers and TV; web design. Benefit fundraising event (i.e., Sanctuary Foundation) could augment the existing government funding and serve as a tool for education and outreach while fostering a sense of ownership for the user public.

Recreation: Knowledge, Attitudes, and Perceptions – S2/3_1

Question/Topic/Goal and Objective:
Are there broader social implications from the implementation of marine protected areas?
Do recreational users feel that the marine protected areas benefit them?
Attitudes and Perceptions
Surveying recreational users on knowledge, perceptions and attitudes, over time, related to MPAs in CINMS

Baseline Measurement(s):
No baseline information available.

Monitoring Activity:
collecting new data

Justification:
Important feedback to management including revelations of misinformation, to determine from where users obtain information, the levels of awareness and understanding, needs for outreach, education and adaptive management, public response to MRWG, goals/objectives. Important feedback to wider fishery management. Develops the necessary relationships for data acquisition for users, the hypothesis-driven, defensible research.

Data Collected:
1. Transparent process for survey design
2. Intercept surveys
3. Visitor surveys to tourists on charter boats
4. Telephone surveys to get appropriate sample of use, survey respondents
5. In person interviews (field surveys) (surveys have to be independently distributed by independent institutions (i.e. university))
6. Consider multi-language issues
7. Use volunteers where possible

How to Obtain:
1. Transparent process for survey design (charter/party boat operators)
2. Intercept surveys (Visitors on charter/party boats)
3. Visitor surveys to tourists on charter boats (private boaters including those who have not yet visited channel islands)
4. Telephone surveys to get appropriate sample of use survey respondents (licensees)
5. In person interviews (field surveys) (surveys have to be independently distributed by independent institutions (i.e. university)) (but restricted to cost control, corrections to avidity (control for frequency of use bias)
6. Consider multi-language issues (surveys on potential users)
7. Use volunteers where possible

Timing:
15 months from collection to compilation
Annual, depending on when MPA changes

Spatial Resolution/Scope:
N/A

Cost:
Combine with S2_1 for no additional costs
Low: $0
Medium: $0
High: $0
See Summary of Recommendation Costs.

Staff:
2 Full Time Employees, could be volunteers
Sources of volunteers: i.e. NOAA, and Naturalist Corps volunteers
Use volunteers to administer surveys, database entry, and public relations.

Funding Sources:
In addition to CINMS and CDFG, SEA GRANT, Saltonstall/Kennedy, and other NOAA grants.

Non-Use Monitoring Recommendations

Non-Use Values: S4_1

Question/Topic/Goal and Objective:
Are there values of reserves to non-users?

Baseline Measurement(s):
Although there have been several National and California statewide surveys about support for no take areas in the marine environment, there have been no studies of nonuse or passive economic use values of the marine environment in California.

Monitoring Activity:
Monitoring the socio-economic impact of reserves on non-users (new data collection)

Justification:
In order to accurately assess the economic costs and benefits of MPAs in the CINMS, the value of non-use must be included. Non-users were identified as potentially the group to benefit the greatest by the socioeconomic panel of the MRWG. The SAC also recognized the need for data on this group. Stakeholders are included as an integral part of the MLPA, and as the law indicates that they need to be included in that process, then they should be included in this one. We recognize that funding limitations would prevent the study from including the general public; however the exclusion of all those with non-use values would significantly underestimate the total value and excludes the greatest benefits to the largest group.

This survey could potentially be included as part of a larger survey looking at user groups (both consumptive and non-consumptive). This could end up being much cheaper than two separate surveys.

The Discovery Channel and National Geographic TV both cater to the "non-use" category of the population- people who may never go to where ever the show is featuring, but are still intrigued and care very much just the same. We CANNOT discount them, nor close their voice out of the process.

Additionally, the resources protected by the MPA system are a national resource and limiting the process to only those who use the resource skews the priorities of how the resources should be allocated.

Data Collected:
Sample: Those who hold non-use values.

- Begin with a sample of people to be surveyed, so that this survey can be performed in conjunction an existing survey.
- Establish the study area as the system of MPAs for which the monitoring program will be established.
- Utilize a contingent valuation method for the survey, with in-person interviews.
- If funding permits, begin assessing nonuse value for the public at large, expanding

the scope / area of the study from the Santa Barbara/Ventura area.
- Follow protocols from NOAA, with best standards developed since then.
- In order to obtain trends in non-use value over time, perform a smaller survey with shorter periods.

Timing:
Initial study will take two years to develop and should be conducted every three years.

Spatial Resolution/Scope:
Values estimated should not be broken down geographically. The scope should be the set of Channel Islands Marine Protected Areas.

Cost:
See Summary of Recommendation Costs.

Staff:
1-2 FTEs.
Volunteers could be trained to help conduct survey interviews, thus cutting agency costs. In the vicinity of the study area there are multiple universities and NGOs from which volunteers could be chosen. Students could aid in surveys as part of class work.

Funding Sources:
Matching funds could be requested from private foundations, coastal communities, local businesses, etc. Cost-sharing by multiple agencies should be encouraged. Private donations/fundraiser events could help, too.

Non-Use Values: S4_2

Question/Topic/Goal and Objective:
What is the economic impact of MPAs to non-users?

Baseline Measurement(s):
Although there have been several National and California statewide surveys about support for no take areas in the marine environment, there have been no studies of nonuse or passive economic use values of the marine environment in California.

Monitoring Activity:
Monitoring the socio-economic impact of reserves on non-users

Justification:
The greatest potential socio-economic benefit of reserves is to the millions of non-users who value preserving healthy ecosystems for their intrinsic worth, and who will perceive the main value of reserves as a means to repair the degradation of marine life by human impacts. The implementation of the reserves will make an enormous cohort across the US, and across the world, feel that the stewards of ocean resources are moving to safeguard marine ecosystems, which are widely recognized as a vital part of the web of life on earth.

Socio-economic monitoring should be prioritized to evaluate impacts in order of their importance. As stated by the socioeconomic panel of the MRWG, non-users are "potentially the largest benefit category of marine protected areas". It would be a serious oversight for the socio-economic monitoring program to ignore this far-reaching benefit. Without explicit consideration of non-user socio-economic benefits, it will not be possible to draw valid conclusions on the reserves' impact.

In summary, engaging the expertise needed to conduct a defensible, ongoing survey of non-user value of reserves should be a top priority of the socio-economic monitoring program.

Data Collected:
Measure non-user benefits of reserves through non-user panels and surveys. These should be national in scope and ideally would have an international component. Benefits to non-users will accrue over time as knowledge of the reserves spreads, so this evaluation should take place yearly. These non-user panels and surveys should be designed in conjunction with education efforts about the reserves.
• Ask all professional image takers (photographers, videographers, film-makers, network and cable TV, internet) who record images in the reserves and elsewhere in the CINMS to assist in tracking broadcasts, webcasts, public exhibitions and sales of their work to non-users (i.e., at distances >100 miles from Reserves).
• Track purchase and use of educational materials arising from reserves by non-users.

1. Begin with non-consumptive users as a demographic subgroup (expected largest

beneficiaries), in conjunction with surveys of non-consumptive users.
2. Establish the study area as the local project area, similar to any survey of non-consumptive users.
3. Utilize a contingent valuation method for the survey, with in-person interviews.
4. If funding permits, begin assessing nonuse value for the public at large, expanding the scope / area of the study in concentric circles from the Santa Barbara area.
5. Follow protocols from NOAA, with best standards developed since then (refer to Hall, Hall and Murray, 2002: Natural Resource Modeling Vol. 15 No 3).
6. A longer term, less expensive survey should be utilized, in order to more accurately assess the valuation as well as changes to the valuation over time as marine protected areas begin restoring health of the environment ($25-50k / yr). The 5- year time frame is important as it ties to improvements of ecosystem richness of MPAs.

Timing:

Spatial Resolution/Scope:
Summary information on marine ecosystems within the different reserve areas, and in both adjacent and remote areas of similar size, would probably be sufficient.

Cost:
See Summary of Recommendation Costs.

Staff:
One FTE could overlap with education/outreach mission
You might be able to use volunteers, if well trained by the Principal Investigator. You would also have to test for interviewer effects of those who have undergone training.

Funding Sources:
Private foundations concerned with the health of the marine environment.
Conduct interviews as part of a larger survey of non-consumptive users in order to reduce costs

Education, Research, and Outreach Monitoring Recommendations

Education, Research, and Outreach: J1_1

Question/Topic/Goal and Objective:
How are educational values impacted by MPAs?
Educator Tracking
For education: be able to track number of educators and participants in education programs relating to MPA areas and added value of MPA areas for these programs.

Baseline Measurement(s):
Currently no baseline information.

Monitoring Activity:
collecting new data

Justification:
Sobel (1996), also cited in Leeworthy and Wiley (2002), discusses the educational and scientific values of MPAs. Although we may not be able to quantify the economic value of MPAs for education or science, we can measure the number of educators and number of participants in education programs as indicators of education and scientific values of MPAs.

Data Collected:
Volunteer registration of education activities through web
Ensure marine protected areas messages in educational programs
Provide education materials to all
Electronic newsletter to educators
Coordinate with professional educational organizations such as NMEA, SWMEA, CREEK Network, and Sanctuary Education Team
Informal contacts with education community
Could include surveys of educators and education programs to get breakdowns of education expenditures and where spent to support estimation of economic impact on local, regional, and national economies.

Timing:
Ongoing

Spatial Resolution/Scope:
N/A

Cost:
Low: $10,000 - $25,000
Medium: $10,000 - $25,000
High: $50,000 - $100,000

Staff:
Minimal Full Time plus volunteers

Funding Sources:
In addition to CINMS and CDFG; Foundations, Etc.

Education, Research, and Outreach: J1_2

Question/Topic/Goal and Objective:
How are scientific values impacted by MPAs?
Research Permit Tracking

Baseline Measurement(s):
May be able to construct baseline from existing permit information. Sanctuary Permit Information and Tracking System (SPITS) is a current database maintained by National Marine Sanctuary Headquarters and is used by each National Marine Sanctuary to track research and permits.

Monitoring Activity:
Use existing data and implement tracking program

Justification:
Sobel (1996), also cited in Leeworthy and Wiley (2002), discusses the educational and scientific values of MPAs. Although we may not be able to quantify the economic value of MPAs for education or science, we can measure the number of educators and number of participants in education programs as indicators of education and scientific values of MPAs.

Required by law, minimize impacts, and get a central database to make sure research activities do not conflict with one another. Number of permits and research funds associated with permits could serve as an indicator of scientific values of MPAs.

Data Collected:
Guided by MLPA, CDFG will require special permit for research in all reserves, permits are site specific and must be used for site management, better chance of occurring if use least invasive method, reports will be required
Implementations should occur in the following manner: Sanctuary and Fish and game coordinate on issuing permits, and Sanctuary gets a copy of all permits for CINMS MPA areas.
Permits should track research funding.
Develop one permit for all (park, sanctuary and all agencies), get one permit on web
Surveys could also be used to get breakdowns on how research funds are spent and where spent that would support estimation of economic impact of research on local, regional, and national economies.

Timing:
Ongoing, with annual summaries of the number of permits and research dollars.

Spatial Resolution/Scope:
N/A

Cost:
See write-up of summary of costs combining with J1_3 for low, medium, and high cost options.

Staff:
Existing Fish and Game Staff plus Sanctuary and Park coordination

Funding Sources:
Existing Agency

Education, Research, and Outreach: J1_3

Question/Topic/Goal and Objective:
Research Project Registration
Voluntary registration of research projects in marine protected areas.

Baseline Measurement(s):
May not be able to establish year zero baseline. May have to settle with shifting baselines depending on response.

Monitoring Activity:
New data collection

Justification:
Sobel (1996), also cited in Leeworthy and Wiley (2002), discusses the educational and scientific values of MPAs. Although we may not be able to quantify the economic value of MPAs for education or science, we can measure the number of educators and number of participants in education programs as indicators of education and scientific values of MPAs.

Permits don't capture all of research activities, especially those that do not have an impact on living resources.

Data Collected:
Website, informal contacts w/in scientific community, symposium to allow researcher to learn what others are doing, science panel meetings.
Could include surveys of researchers to get breakdowns of research funds and where spent, which would allow estimation of economic impacts of spending on local, regional, and national economies.

Timing:
New project, ongoing with annual summary reports

Spatial Resolution/Scope:
N/A

Cost:
See write-up of summary of costs. Combining with J1_2 for low, medium, and high cost options.

Staff:
Perhaps 1 full time

Funding Sources:
Foundations/Agencies

Education, Research, and Outreach: J1_4

Question/Topic/Goal and Objective:
Public Outreach
Inform users and non-users about the results (biological and socio-economic) of MPA monitoring programs

Monitoring Activity:
Summarization of program results.

Justification:
Improved knowledge and public awareness of MPAs. If this is not done, the investments made in the monitoring program may be wasted

Data Collected:
Web (results of biological and socio-economic data in user-friendly format), e-newsletter, presentations, list-serve for disasters, speakers bureau, press releases and op-ed pieces, events, updated displays (capitalize World Oceans Day and Earth Day)

NOTE: Pre-Workshop survey results recommend the following:
75% - Want Internet updates
69% - Want newsletters (25% bi-annual, 20% quarterly, 16% annual, 8% more often)
66% - Want Fish and Game Commission meeting updates (29% annual, 29% bi-annual, 8% more often)
50% - Want Sanctuary Advisory Council meeting updates
50% - Want large annual public meeting updates
45% - Want smaller town hall meeting updates (29% annual, 8% bi-annual, 8% more often)

Timing:
See Above recommendations for timing

Spatial Resolution/Scope:
N/A

Cost:
Included in existing Agency funds.
$0 annual cost

Staff:
Included in existing Agency Staffing

Funding Sources:
Included in existing Agency funds.

Education, Research, and Outreach: J1_5

Question/Topic/Goal and Objective:
Use of Volunteers
Include volunteers in monitoring of MPAs at all levels (socio-economic and biological)

Monitoring Activity:
Various volunteer programs.

Justification:
A way to engage the local community in ocean stewardship.

Potential Programs:
Research
*REEF fish surveys
Bird Monitoring
Marine Mammals Monitoring
Fish Monitoring
Human activity monitoring (environmental disturbance)
*Educational docent/naturalist programs (CI Naturalist Corp)
help during natural or man-made disasters (HAZ Wopper training, maintain list of trained volunteers)
Beach Monitoring
Surveys of MPA use
Monitoring research and education activities

How to Implement:
Work with educational institutions
Outreach to all parties about volunteers (adult ed, etc)
Speaker's bureau
Important to track all volunteer hours and events
Need budget to cover volunteer programs
Possible donations to foundation for volunteer services/sponsorship
Partnership between CINMS/CINP and private, academics, etc.
Website to facilitate volunteer participation (links to all on-going volunteer activities and contact info, CINMS to act as a portal)

Volunteer Diver Program, need for scientific diving training/certification to AAUS standard

NGO involvement – educational enforcement (Sanctuary marine watch), monitor on-site uses of MPAs, supply matching funds.

Potential for collaboration with Biological Monitoring Activities

In order to maximize the effectiveness of funding for the monitoring activities associated with the Channel Islands Marine Protected Areas, the identification of activities that can be performed collaboratively toward multiple goals is a key component. Measurement activities for which a modification could lead to the achievement of goals from both the biological side and the socioeconomic side would be well worth the effort, in terms of efficiency. The following discussion is of areas where this potential may exist.

One area of potential collaboration is monitoring the *edge effect* of commercial and recreational fishermen on the socioeconomic side and addressing the *landscape* topic in the intertidal monitoring group on the biological side. Although the questions to be answered by the two measurement activities are very different, the means by which the data is collected could be utilized by both activities and therefore, combined into one effort. The methods of collection for the *landscape* activity include landscape-level imaging, from helicopter or the equivalent during periods of low tide. The data collected include digital images of the shoreline. The methodology could be modified with regard to the frequency of measurement and the spatial parameters to accommodate the requirements of the *edge effects* measurement activity. While the three edge effect proposals additionally involve surveys, these data could be used as background and as a confirmation (ground truth) of the survey data.

Fishers who are displaced may also be an excellent source of data. In instances where commercial fishing panels or panels of recreation operators are used as a vehicle for socioeconomic data collection, these same panels could be asked whether they would be willing to host collectors biological data such as those needed for the topic, *Changes within reserves, compared to adjacent and distant areas* in the s*hallow subtidal fish* group. This measurement activity lists "alternative programs (collaborative or volunteer)" as a potential means of gathering the data. Another biological monitoring topic that this might be appropriate for is *Growth Monitoring*, in the *Deep Subtidal* group. The activity calls for "catch, measure, and tag studies", which could be easily accomplished from the commercial or recreational fishing boat as the survey vehicle. The fishing panels may be the appropriate collaborators for this type of monitoring.

A topic that may become very relevant to fishers in the study area is the potential for the spillover effect. The issue is addressed directly in the *spillover* topic as part of the *Deep Subtidal Group*. Several aspects of this proposal make it an excellent candidate for collaboration. One of the most important is the measurement of "Geo-referenced estimates of fishing efforts and catch per unit of effort (CPUE)." This type of data collection is inherently tied to measuring changes in catch, as called for in the *Use, Catch and Value* group on the socioeconomic side. The *spillover* topic specifically calls for a collaborative arrangement under the data collection element, where one of the features being "mark and recapture with sport and commercial boats."

Glossary

Angler/Angling

A person catching or attempting to catch fish or shellfish with no intent to sell. This includes people releasing the catch. Commonly referred to as recreational fisherman/fishing.

Assessments

An evaluation using a variety of information and methods of analysis. All evaluations entail some level of uncertainty, whether due to quality of the data or projections about future events.

Baseline Conditions

The biophysical and human conditions that exist before a proposed action is implemented. The baseline is used in environmental and socioeconomic impact analysis to define the biophysical and human conditions that may be impacted due to a proposed action.

Bequest Value

The economic value to people that never plan to visit, but would be willing to pay an amount to ensure that others (e.g. their children or future generations) will have the opportunity to experience something (e.g., natural resources, cultural resources, etc.) in a certain protected condition. Bequest value is a form of non-market economic values and a form of consumer's surplus.

California Environmental Quality Act (CEQA)

The basic goal of the California Environmental Quality Act (CEQA) (Pub. Res. Code §21000 et seq.) is to develop and maintain a high-quality environment now and in the future, while the specific goals of CEQA are for California's public agencies to:

1) identify the significant environmental effects of their actions; and, either
2) avoid those significant environmental effects, where feasible; or
3) mitigate those significant environmental effects, where feasible.

CEQA applies to "projects" proposed to be undertaken or requiring approval by State and local government agencies.

"Projects" are activities that have the potential to have a physical impact on the environment and may include the enactment of zoning ordinances, the issuance of conditional use permits and the approval of tentative subdivision maps.

Where a project requires approvals from more than one public agency, CEQA requires ones of these public agencies to serve as the "lead agency." A "lead agency" must complete the environmental review process required by CEQA. The most basic steps of the environmental review process are:

1) Determine if the activity is a "project" subject to CEQA;
2) Determine if the "project" is exempt from CEQA;
3) Perform an Initial Study to identify the environmental impacts of the project and determine whether the identified impacts are "significant". Based on its findings of "significance", the lead agency prepares one of the following environmental review documents:
    a) Negative Declaration if it finds no "significant" impacts;
    b) Mitigated Negative Declaration if it finds "significant" impacts but revises the

project to avoid or mitigate those significant impacts;
c) Environmental Impact Report (EIR) if it finds "significant" impacts.

While there is no ironclad definition of "significance", the State CEQA Guidelines provides criteria to lead agencies in determining whether a project may have significant effects in Article 5.

The purpose of an EIR is to provide State and local agencies and the general public with detailed information on the potentially significant environmental effects which a proposed project is likely to have and to list ways which the significant environmental effects may be minimized and indicate alternatives to the project.

Catch Per Unit Effort (CPUE)

The number of fish or invertebrates caught by an amount of effort. Typically, effort is a combination of gear type, gear size, and the length of time gear is used. Catch per unit of effort is often used as a measurement of relative abundance for a particular fish or invertebrate.

Consumer's Surplus

The amount that a person is willing to pay for a good or service over and above what they actually have to pay for a good or service. The value received is a surplus or net benefit. In the case of natural resources, for which no one owns the resources and can't charge a price for use of the resources, consumer's surplus is referred to as a non-market economic value, since the goods and services from the natural resources are not traded in markets. Consumer's surplus is applicable to both use and nonuse or passive use value. Consumer's surplus is also relevant to commercial seafood products. If supply of commercial seafood products are reduced (increased) for commercial seafood products and holding other factors constant, if prices to consumers rise (fall) then there will be a loss (gain) in consumer's surplus.

Consumptive Use

Any activity that involves the removal of some resource. This includes, but is not limited to, all forms of fishing, marine life collection, kelp harvesting, mineral extraction, or alterations in the marine environment.

Contingent Valuation

A methodology to determine money measures of change in welfare by describing a hypothetical situation to respondents and eliciting how much they would be willing to pay either to obtain or to avoid a situation.

Cost Benefit Analysis

A technique to compare the relative economic efficiency of different states of the world usually brought about by undertaking projects or policies. A comparison is made between gross benefits of a project or policy and the opportunity costs of the action. Benefits and costs are measured as changes in consumer and producer surpluses accruing to individuals in society. Cost Benefit Analysis (CBA) does not include measures such as sales/output, income, employment or tax revenues. CBA is usually conducted under the assumption of full employment and mobility of resources. When these assumptions are violated adjustment costs for labor and capital can be included.

Displacement

The extent to which affected users are no longer able to participate in restricted activities. Here displacement refers to people that are affected by their activities being eliminated from within the marine protected areas.

Economic Impact

Measures the importance of an industry, resource, regulation, or policy in terms of the sales/output, income, employment, or tax revenues provided and the goods and services it consumes, on a direct, indirect, and induced basis (see multiplier effect). The measures used here are captured in official government accounts of economic activity.

Economic Value

The amount of consumer's and producer's surplus directly or indirectly obtained from a good or service. These values are not captured in official government accounts of economic activity. Economic value is based on both willingness to pay and ability to pay. The ability to pay part distinguishes economic value from the deep ecologist notion of human's intrinsic value for some natural resource. Economic values are constrained by income and wealth.

Edge Effect

The expected attraction of consumptive resource users to the outer edge of the marine protected areas (e.g., in expectation of benefits from spillover). If positive spillover is experienced, then the "edge effect" will have positive benefits. If the attraction leads to too many consumptive users, whose consumption exceeds the amount of spillover, then the "edge effect" could lead to crowding or congestion effects or costs instead of benefits.

Ethnography

The social scientific study of people and culture using participant observation, interviews, artifacts and records.

Ex Vessel Value

The revenue fishermen receive for their catch or the value of catch at dockside, before it is processed or marketed to consumers.

Existence Value

The value of a resource to people who never plan to use the resource, but would be willing to pay an amount to ensure the resource exists in a certain protected condition. This value is sometimes referred to as part of non-market, nonuse or passive economic use value. It is also generally a type of consumer's surplus. This concept has been applied to both natural resources and cultural resources.

Geographic Information Systems (GIS)

A computer mapping system that links databases of geographically-based information to maps that display the information.

Intercept Surveys

A data collection technique in which (consumptive or non consumptive) resources users are systematically interviewed dockside and at marinas as they begin or return from a day's activity.

Local Economy

In the field of regional economics, it is common to refer to local economies as being either a county or multiple counties. When the number of counties is large, it is customary to refer to them as representing a regional economy. The county is usually the smallest unit for economic impact analysis because economic data is generally not available at the sub-county level, except in cases where cities or towns have populations greater than 50,000. But even here most information is not available and is classified as nondisclosure because there are less than 10 firms in a particular economic sector. This limits the ability to conduct economic impact analyses at the sub-county level. The same is not true for demographic information from the U.S. Bureau of the Census. Sub-county data is often available to support social impact analyses.

Marine Conservation Area

A "marine conservation area," is a non-terrestrial marine or estuarine area, not limited to state waters, that is designated so the managing agency may achieve one or more of the following:

1. Protect or restore rare, threatened or endangered native plants, animals or habitats in marine areas;

2. Protect or restore outstanding, representative or imperiled marine species, communities, habitats and ecosystems;

3. Protect or restore diverse marine gene pools;

4. Contribute to the understanding and management of marine resources and ecosystems by providing the opportunity for scientific research in outstanding, representative or imperiled marine habitats or ecosystems;

5. Preserve outstanding or unique geological features; or

6. Provide for sustainable living marine resource harvest.

Restrictions: it is unlawful to injure, damage, take or posses any specified living, geological or cultural marine resources for certain commercial, recreational, or a combination of commercial and recreational purposes. In general, the designating entity or managing agency may restrict any commercial and/or recreational uses that would compromise protection of the species of interest, natural community, habitat or geological features.

Allowable uses: research, education and recreational activities, and certain commercial and recreational harvest of marine resources may be permitted.

Marine Life Reserve

A marine protected area in which all extractive activities, including the taking of marine species, and, at the discretion of the commission and within the authority of the commission, other activities that upset the natural ecological functions of the area, are prohibited. While, to the extent feasible, the area shall be open to the public for managed enjoyment and study, the area shall be maintained to the extent practicable in an undisturbed and unpolluted state.

Fish and Game Code Section 2860 (b) further clarifies permissible activities in "marine life reserves":

"Notwithstanding any other provision of this code, the taking of a marine species in a marine life reserve is prohibited for any purpose, including recreational and commercial fishing, except that the commission may authorize the taking of a marine species for scientific purposes, consistent with the purposes of this chapter, under a scientific collecting permit issued by the department."(emphasis added)

Marine Protected Area

"Marine Protected Area" (MPA) means a named, discrete geographic marine or estuarine area seaward of the high tide line or the mouth of a coastal river, including any area of intertidal or subtidal terrain, together with its overlying water and associated flora and fauna that has been designated by law, administrative action, or voter initiative to protect or conserve marine life and habitat. MPA classifications include marine life reserves (the equivalent of the State Marine Reserve classification), State Marine Parks, which allow recreational fishing and prohibit commercial extraction, and State Marine Conservation Areas, which allow for specified commercial and recreational activities, including fishing for certain species but not others, fishing with certain practices but not others, and kelp harvesting, provided that these activities are consistent with the objectives of the area and the goals and guidelines of this chapter. MPAs are primarily intended to protect or conserve marine life and habitat, and are therefore a subset of marine managed areas (MMAs), which are broader groups of named, discrete geographic areas along the coast that protect, conserve, or otherwise manage a variety of resources and uses, including living marine resources, cultural and historical resources, and recreational opportunities. Marine managed area classifications include State Water Quality Protection Area, State Marine Cultural Preservation Area, and State Marine Recreational Management Area.

Marine Reserve

A "marine reserve," is a non-terrestrial marine or estuarine area that is designated so the managing agency may achieve one or more of the following:

1. Protect or restore rare, threatened or endangered native plants, animals or habitats in marine areas;

2. Protect or restore outstanding, representative or imperiled marine species, communities, habitats and ecosystems;

3. Protect or restore diverse marine gene pools; or

4. Contribute to the understanding and management of marine resources and ecosystems by providing the opportunity for scientific research in outstanding, representative or imperiled marine habitats or ecosystems.

Restrictions: it is unlawful to injure, damage, take or possess any living, geological or cultural marine resource, except under a permit or specific authorization from the managing agency for research, restoration or monitoring purposes. While, to the extent feasible, the area shall be open to the public for managed enjoyment and study, the area shall be maintained to the extent practicable in an undisturbed and unpolluted state. Therefore, access and use (such as walking, swimming, boating and diving) may be restricted to protect marine resources.

Allowable uses: research, restoration and monitoring may be permitted by the managing agency. Educational activities and other forms of non-consumptive human use may be permitted by the designating entity or managing agency in a manner consistent with the protection of all marine resources.

Marine Reserve Working Group (MRWG)

Stakeholder based community group created by the Channel Islands National Marine Sanctuary, Sanctuary Advisory Council (SAC) in June 1999. The MRWG membership, which was set by the SAC, was designed to represent the full range of community perspectives, including representatives of the public-at-large, commercial fishing interests, recreational fishing and diving, and non-consumptive interests. The MRWG was comprised of 17 members, which included 5 members from the SAC. The MRWG collaborated over 22 months, from July 1999 to May 2001, seeking agreement on a recommendation to the SAC regarding the potential establishment of marine reserves (no-take zones) within the Channel Islands National Marine Sanctuary.

Metadata

Information about the data. It describes the characteristics (content, location, quality, structure, etc) of the data set, allowing a user to understand what they are looking at.

Monitoring

This is an information gathering method designed assess the status of biophysical and/or human conditions or establish the relationship between biophysical factors and or human factors. Monitoring is often used in the context of adaptive management.

Multiplier Effects

This is a concept used in regional economic analysis that is based on the interrelationships among different sectors of an economy. Multiplier effects show the secondary economic effects of initial spending related to an activity. The initial spending effects are referred to as the "direct effects" and the secondary effects as the "indirect and induced" effects. The size of multipliers is related to the geographic extent of the definition of the economy being analyzed. The larger the geographic area of analysis, the greater the size of the multipliers.

Non-Consumptive Use

Use that does not involve a removal or alteration of any resources. This includes, but is not limited to whale-watching, swimming, photography, snorkeling and diving (when no species are harmed, disturbed, or taken), etc.

Option Value

The economic value or willingness to pay for the right to use an environmental resource at some future date. Option values stem from the combination of the individuals uncertainty about their future demand for use of the resource and about the uncertainty of future supply of the resource.

Passive Economic Use (Non-Use)

Values that are not associated with direct use, or even the option to use a good or service. These have been referred to as non-use economic values. The use of the terminology of passive economic use for non-use values is due to the fact that people must have knowledge of whatever they are valuing. People gain knowledge of whatever they are valuing by newspapers, magazines, newsletters, books, radio, television or any other media. Obtaining knowledge of whatever is being valued through these various forms of media is referred to as passive consumption (not direct contact with whatever is being valued), hence the term passive economic use value. Existence and bequeath value are passive economic use values. These values are also another form of consumer's surplus values.

Pelagic

Fish that continually move from place to place.

Public Good

Public goods are defined as being non-rival and non-excludable in use. One's use of the good is not diminished by others' use of it. For example, an aesthetic view is a pure public good. No matter how many people enjoy the view, others can also enjoy it.

Quasi-Option Value

The economic value or willingness to pay to get better information by delaying a decision that may result in irreversible environmental loss. This kind of value may be obtained when future technologies or knowledge enhance the value of a natural resource. Quasi Option Value stems from uncertainty about the future demand and supply of a resource as with option value. The difference is that with Quasi-Option value the uncertainty is about our current scientific and technological knowledge. This concept is often employed when addressing the possible future medical or pharmalogical benefits of natural resources.

Sanctuary Advisory Council (SAC)

As an advisory body to the Sanctuary Manager, the Council provides a public forum for consultation and deliberation and offers community-based advice to the Sanctuary Manager. This is a community-based participatory process that assures continued public input to management decision-making, while at the same time expanding public awareness about the Sanctuary and challenging marine resource management issues. Specifically, the Council's objectives are to provide the Sanctuary manager with advice on:

- Protecting natural and cultural resources, and identifying and evaluating emergent or critical issues involving Sanctuary use or resources;
- Identifying and realizing the Sanctuary's research objectives;
- Identifying and realizing educational opportunities to increase the public knowledge and stewardship of the Sanctuary environment; and
- Assisting to develop an informed constituency to increase awareness and understanding of the purpose and value of the Sanctuary and the National Marine Sanctuary Program.

Council members have been appointed competitively by NOAA and will serve three-year terms.

Sea Grant

The National Sea Grant Program encourages the wise stewardship of our marine resources through research, education, outreach and technology transfer. Sea Grant is a partnership between the nation's universities and National Oceanic and Atmospheric Administration, which began in 1966, when the U.S. Congress passed the National Sea Grant College Program Act.

Sentinel Fisherman

This is a program that uses a local fisherman to fish in "no take zones", along the edge of the "no take zones" and in control areas open to fishing to obtain information on catch per unit of effort to assess the success of the "no take zones". The Sentinel Fisherman Program is being used to monitor the "no take zones" in the Florida Keys National Marine Sanctuary.

Socioeconomics

The study of society as it relates to the economic structure (including such factors as labor categories, employment, and income of a particular area), social and cultural groups, institutions, and how these are affected by change.

Stakeholder

Refers to anyone who has an interest in or who is affected by management actions.

State Marine Park

A "marine park," is a non-terrestrial marine or estuarine area, restricted to state waters, that is designated so the managing agency may provide opportunities for spiritual, scientific, educational, and recreational opportunities, as well as one or more of the following:

1. Protect or restore outstanding, representative or imperiled marine species, communities, habitats and ecosystems;

2. Contribute to the understanding and management of marine resources and ecosystems by providing the opportunity for scientific research in outstanding, representative or imperiled marine habitats or ecosystems;

3. Preserve cultural objects of historical, archaeological and scientific interest in marine areas; or

4. Preserve outstanding or unique geological features.

Restrictions: it is unlawful to injure, damage, take or possess any living or nonliving marine resources for commercial exploitation purposes. The designating entity or managing agency may restrict any human use that would compromise protection of the species of interest, natural community or habitat, or geological, cultural or recreational features.

Allowable uses: all other uses are allowed, including scientific collection with a permit, research, monitoring, and public recreation (including recreational harvest, unless otherwise restricted). Public use, enjoyment and education are encouraged, in a manner consistent with protecting resource values

Tagging Program

A method by which fish caught using catch and release are tagged in an effort to monitor how fish move around. Tagging could be used to help with estimating spillover effects of marine protected areas.

Take

Under the Endangered Species Act, any action that may harass, harm, pursue, hunt, wound, shoot, kill, trap, capture, or collect a listed species or attempts to engage in any such activities (16 U.S.C. 1532).

Threshold

A point separating conditions that will produce a given effect from conditions that will not produce the effect. Thresholds indicate when a measurement reaches a level signifying the need

for policy/management action. As used here, measurement thresholds cannot be established by social scientists. Instead, measurement thresholds for socioeconomic measurements on individuals and groups are based on "social" value judgments best left to the political process.

Variance

A measure of the spread or dispersion of a variable around its mean. As used here, variance provides a measure of certainty about estimates of socioeconomic measures. In a monitoring program, one is comparing measurements over time. Large variances preclude making inferences about whether there has been a statistically significant change in a measurement.

Willingness To Pay

The amount – measured in goods, services, or dollars- that a person is willing to give up to get a particular good or service. Willingness to pay is used to derive economic values, which depend both on willingness to pay and ability to pay

Acronym List

AAUS
American Academy of Underwater Sciences
CDFG
California Department of Fish and Game
CDP
Census Designated Place
CEQA
California Environmental Quality Act
CG
Coast Guard
CINMS
Channel Islands National Marine Sanctuary
CINPS
Channel Islands National Park
CPFV
Commercial Passenger Fishing Vessel
CPUE
Catch per unit effort
CSLB
California State at Long Beach
CSUCI
California State University - Channel Islands
EDD
Employee Development Department
FEAM
Fishery Economic Assessment Model
FTE
Full time employee
GIS
Geographic information system
GPS
Global positioning system
IFR
Institute of Fisheries Resources
IPCO
Island Packers Inc.
MLPA
Marine Life Protection Act
MMS
Minerals Management Service
MPA
Marine Protected Area
MRFSS
Marine Recreational Fisheries Statistics Survey
MRWG
Marine Reserves Working Group
NMEA
National Marine Educators Association

NMFS
National Marine Fisheries Service
NGO
Non-Governmental Organization
NOAA
National Oceanic and Atmospheric Administration
NP
National Park
NPS
National Park Service
PacFIN
Pacific Fisheries Information Network
PFMC
Pacific Fisheries Marine Council
PDA
Personal Digital Assistant
PMCC
Pacific Marine Conservation Council
PSMFC
Pacific States Marine Fisheries Commission
RATP
Restricted Access Policy Team
REEF
Reef Environmental Education Foundation
RFP
Requests for Proposals
SAC
Sanctuary Advisory Council
SAMSAP
Sanctuary Aerial Monitoring Spatial Analysis Program
SAS
Statistical Analysis Software
SBCC
Santa Barbara Chamber of Commerce
SFRA
Sustainable Fishery Research Association
SK
Saltonstall-Kennedy
SPITS
Sanctuary Permit Information and Tracking System
SPSS
Statistical Package for the Social Sciences
SWMEA
Southwest Marine and Aquatic Educators Association
UCSB
University of California - Santa Barbara
VC
Ventura County
WTP
Willingness to Pay

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Appendix A
List of Workshop Participant Contact Information

Jessica Alstatt
Program Director & Biologist
Santa Barbara Channel Keeper
714 Bond St.
Santa Barbara, CA 93103
Jessie@sbck.org

Debbie Aseltine-Neilson
Recreational CPFV logbook data
CA Dept of Fish and Game
4949 Viewridge Ave.
San Diego, CA 92123
daseltine@dfg.ca.gov

Ken Bortolazzo
Fisherman
326 S. Voluntario St.
Santa Barbara, CA 93103

Alex Brodie
Island Packers
1691 Spinnaker Drive, Suite 105B
Ventura, CA 93001
(805) 443-9208
alexbrodie@cox.net

Warner Chabot
Vice President for Regional Operations
The Ocean Conservancy
116 New Montgomery St., Suite 810
San Francisco, CA 94105
(415) 979-0900
wchabot@oceanconservancyca.org

Chuck Cook
Nature Conservancy
201 Mission St., 4th Floor
San Francisco, CA 94105

Tom Culliton
NOAA/NOS/Special Projects
1305 East-West Hwy., (SSMC4) 9th Floor
Silver Spring, MD 20910
(301) 713-3000, ext. 142
Tom.Culliton@noaa.gov

William Freudenburg
Professor of Environmental Policy
University of California Santa Barbara
Goleta, CA
freudenb@envst.ucsb.edu

Carl and Beth Gwinn
Scuba Divers
213 Fir Tree Place
Goleta, CA 93117

Darwin Hall
California State University, Fullerton
dhall@csulb.edu

Michael Hanrahan
President - The Ocean Channel, Inc.
4692 Carpinteria Ave. #1
Carpinteria, CA 93103
michael@ocean.com

Michael Harrington
Fisherman
unomas@silcom.com

Sean Hastings
Channel Islands National Marine Sanctuary
113 Harbor Way, Suite 150
Santa Barbara, CA 93109
Sean.Hastings@noaa.gov

Justin Hospital
NOAA/NOS/Special Projects
1305 East-West Hwy., (SSMC4) 9th Floor
Silver Spring, MD 20910
(301) 713-3000, ext. 105
Justin.Hospital@noaa.gov

Monica Hunter
Sociocultural Anthropologist
P.O. Box 4338
San Luis Obispo, CA 93403
mshunter@charter.net

William James
Nearshore Fisherman/Consultant
(805) 474-1749
halibutbill@webtv.net

Eric Kett
Recreational Boater/Charter Operator
5140 Beachcomber St.
Oxnard, CA 93035
(805) 895-9322
seazen@gte.net

Bob Leeworthy
NOAA/NOS/Special Projects
1305 East-West Hwy., (SSMC4) 9th Floor
Silver Spring, MD 20910
(301) 713-3000, ext. 138
Bob.Leeworthy@noaa.gov

Harry Liquornik
President - Commercial Fishermen of SB, Inc.
1421 Robbins St.
Santa Barbara, CA 93101
abreojos.one@verizon.net

Mike McCorkle
SC Trawlers Association
P.O. Box 713
Summerland, CA 93067

Merit McCrea
Recreational Fishing
1762 ½ Prospect Ave.
Santa Barbara, CA 93103
seahawk@rain.org

Michael Murray
Channel Islands National Marine Sanctuary
113 Harbor Way, Suite 150
Santa Barbara, CA 93109
Michael.Murray@noaa.gov

Doug Obegi
The Ocean Conservancy
116 New Montgomery St., Suite 810
San Francisco, CA 94105
dobegi@oceanconservancyca.org

Bob Osborn
Fishery Consultant
United Anglers
P.O. Box 385
Surfside, CA 90743
(714) 840-0227
bob@unitedanglers.com

Sara Peterson
Biologist – Marine Fisheries
California Department of Fish and Game
350 Harbor Blvd.
Belmont, CA 94002
SAPeterson@dfg.ca.gov

Diane Pleschner-Steele
DB Pleschner & Associates
P.O. Box 336
Buellton, CA 93427
(805) 965-5840
dplesch@earthlink.net

Caroline Pomeroy
Associate Research Scientist
Institute of Marine Sciences
Earth & Marine Sciences Bldg A316
UC Santa Cruz
Santa Cruz, CA 95064
cpomeroy@ucsc.edu

Tom Raftican
President
United Anglers of Southern California
716 Calle Palo Colorado
Santa Barbara, CA 93105
(714) 840-0227
refish@earthlink.com

Steve Rebuck
ITQ Establishment Committee
P.O. Box 571
San Luis Obispo, CA 93406
(805) 544-5415
ABSforMan@aol.com

Cynthia Rossi
GIS analyst, Marine Economist
California Department of Fish and Game
20 Lower Ragsdale Rd
Monterey, CA 93940
crossi@dfg.ca.gov

Jesus Ruiz
Scuba Instructor
YMCA Scuba Program
477 Blossom Hill Rd
San Jose, CA 95123
Yscuba@CaliforniaDivers.com

Ky Russell
Institute for Fisheries Resources
P.O. Box 29196
San Francisco, CA 94129
krussell@ifrfish.org

Astrid Scholz
Ecological Economist
Ecotrust
P.O. Box 29189
San Francisco, CA 94129
(415) 561-2433
ajsholz@ecotrust.org

Manoj Shivlani
Sociologist/GIS
Rosenstiel School of Marine and
Atmospheric Science
4600 Rickenbacker Causeway
Miami, FL 33149
mshivlani@rsmas.miami.edu

Cindy Thomson
Southwest Fisheries Science Center
110 Shaffer Rd
Santa Cruz, CA 95060
Cindy.Thomson@noaa.gov

Terry Tillman
Department of Fish and Game
1296 East Gibson Rd. #233
Woodland, CA 95776
ttillman@dfg.ca.gov

John Ugoretz
California Department of Fish and Game
1933 Cliff Drive, Suite 9
Santa Barbara, CA 93109
(805) 560-6758
jugoretz@dfg.ca.gov

Wade Van Buskirk
MRFSS
45 SE 82nd Drive, Suite 100
Gladstone, OR 97027
wade@psmfc.org

Barbara Walker
Assistant Researcher
National Center for Geographic
Information and Analysis
University of California
Santa Barbara, CA 93106
bwalker@geog.ucsb.edu

Peter Wiley
NOAA/NOS/Special Projects
1305 East-West Hwy., (SSMC4) 9th Floor
Silver Spring, MD 20910
(301) 713-3000, ext. 139
Peter.Wiley@noaa.gov

Kate Wing
Natural Resources Defense Council
71 Stevenson St.
San Francisco, CA 94105
kwing@nrdc.org

David Yarger
Commercial Fisherman
PCFFA/IFR
dacaya@aol.com

Mark Zegler
Graduate Student
UCSB Maritime Anthropology & Policy
mzegler@umail.ucsb.edu

Appendix B
SAC Recommendations/Priorities (Pre-Workshop)

CHANNEL ISLANDS NATIONAL MARINE SANCTUARY
SANCTUARY ADVISORY COUNCIL

September 13, 2002

Priority Ranking Exercise
Possible Socioeconomic Monitoring Activities for Marine Reserves

This exercise is designed purely to gauge your ranking preferences as a representative of your constituents, so that we may provide socioeconomic workshop participants with a clear idea of the community's preferences on monitoring direction.

The three major categories of possible socio-economic monitoring activities include:

I. Commercial fisheries
II. Recreational fisheries and recreational consumptive diving
III. Recreational non-consumptive uses

Please consider each category separately in assigning priority rankings. Please rank all options.

Example: 1 = highest priority, 5 = lowest priority

Name: _____

SAC Seat: _____

SAC Priority Ranking Exercise
Possible Socioeconomic Monitoring Activities for Marine Reserves

I. Commercial Fisheries

NOTE: Red text = modifications suggested by the SAC on 9-13-02

	Possible Activities	Baseline Data	Rank	Group
I. A	Monitor catch and value of catch for CINMS and surrounding areas using California Department of Fish and Game trip ticket data by 10-minute by 10-minute blocks. Use 22-block definition of CINMS and all other blocks from Point Conception to Mexican border for surrounding areas. (Annually). **Narrow scale to 1x1-mile blocks**	Thorough information exists	**1**	**S1A**
I. B	Commercial Fishing Panels – Costs, Earnings and Investment. Choose representative panels of commercial fishermen of the CINMS. Panels of fishermen displaced from marine reserves and panels of fishermen not displaced from reserves (did not fish in areas designated as marine reserves before being designated as such). (Annually). **Include tracking of marinas, ports and harbors; Track changes in unemployment reporting; Include marginal fishermen in Panels**	Thorough information exists	**2**	**S1B**
I. C	Other regulations and management strategies. Fisheries will likely be impacted not only by general environmental conditions and the marine reserves, but also other regulations and management strategies. Assessments of the impacts of marine reserves on fishermen must take into account these other factors. (Annually).	More information needed	**3**	
I. D	Knowledge, Attitudes and Perceptions of management strategies and regulations (including no take regulations), along with socioeconomic profiles of fishermen. This must be done with representative samples of fishermen using survey methodologies. (Every 5 years).	More information needed	**4**	**S1B**
I. E	Edge Effects of Marine Reserves. Spatially document "edge effect" of consumptive uses in proximity to marine reserves.		**2**	**S1A**
	Other:			
	Other:			

SAC Priority Ranking Exercise
Possible Socioeconomic Monitoring Activities for Marine Reserves

II. Recreational Fisheries and Recreational Consumptive Diving

NOTE: Red text = modifications suggested by the SAC on 9-13-02

	Possible Activities	Baseline Data	Rank	Group
II. A	Monitor use and catch for Southern California using the National Marine Fisheries Service, Marine Recreational Fishing Statistics Survey (NMFS-MRFSS). (Annually).	More information needed	2	S2A
II. B	Charter boat/party boat/guide Panels – Costs, Earnings, Investment and Use. For use, possibly include spatial component as in 1999. Panels of fishermen displaced from marine reserves and panels of fishermen not displaced from marine reserves (did not fish in areas designated as marine reserves before being designated as such. (Annually). **Include tracking of marinas, ports and harbors; Include in panel studies evaluation of if/where charter boats relocate**	More information needed	1	S2B
II. C	Other regulations and management strategies. (Annually).	More information needed	4	
II. D	Knowledge, Attitudes and Perceptions of management strategies and regulations (including no take regulations), along with socioeconomic profiles of charter/party/guide boat owners, captains and mates. This must be done with representative samples of charter/party/guide boat owners, captains and mates using survey methodologies. (Every 5 years).	More information needed	5	S2B
II. E	Edge effects of Marine Reserves. Spatially document "edge effect" of consumptive uses in proximity to marine reserves.		3	S2A
	Other:			
	Other:			
	Other:			

SAC Priority Ranking Exercise
Possible Socioeconomic Monitoring Activities for Marine Reserves

III. Recreational Non-consumptive Uses

NOTE: Red text = modifications suggested by the SAC on 9-13-02

	Possible Activities	Baseline Data	Rank	Group
III. A	Charter/party/guide/concessionaire Boat Panels – Costs, Earnings, Investment and use. This would be done in conjunction with the consumptive use, since the same operations engage in both consumptive and non-consumptive uses. For use, possibly include spatial component as in 1999. (Annually).	More information needed	**1**	**S3B**
III. B	Private household boat use. This would employ a survey of California boaters and would be part of a statewide boating study. Additional information on socioeconomic profiles of users, spending profiles and knowledge, attitudes and perceptions of management strategies and regulations could be added to the survey. This would be a rather expensive item and would require multiple-agency partnership. (Every 5-10 years). **Include tracking of marinas, ports and harbors**	More information needed	**3**	**S3A**
III. C	Knowledge, Attitudes and Perceptions of management strategies and regulations (including no take regulations), along with socioeconomic profiles of charter/party/guide/concessionaire boat owners, captains and mates. This must be done with representative samples of charter/party/guide/concessionaire boat owners, captains and mates using survey methodologies. (Every 5 years).	More information needed	**4**	**S3B**
III. D	Other management strategies and regulations that impact non-consumptive users. (Annually).	More information needed	**5**	
III. E	Non-consumptive uses within marine reserve areas. Spatially document uses within reserves.		**2**	**S3A**
III. F	Other: **Identify additional user groups (e.g., educators, researchers) and how the reserves impact their activities**		**6**	**J1**
III. G	Other: **Measure indirect (non-use) value of marine reserves**		**5**	
	Other:			

Appendix C
Socioeconomic Monitoring CINMS
What We Know? (Pre-Workshop)

Commercial Fisheries

1. Catch and Ex Vessel Value of Catch (what the fishermen receive for catch) from the California Department of Fish and Game (CDFG) fish ticket system. Data is organized in 10-minute by 10-minute blocks (100 nautical square miles). We currently have the data for years 1988 – 2000. Catch and Ex Vessel Value is available by fisherman, species, gear and port where landed. We currently use a 22-block definition for the CINMS. Other areas can be defined using data from surrounding blocks. We organized the information into 27 species groups, 14 of which accounted for over 99 percent of the ex vessel value of catch from the CINMS.

2. Catch and Ex Vessel Value of Catch for 1999 in 1-minute by 1-minute cells (1 nautical square mile) for the following species groups:

   1) Market Squid
   2) Kelp
   3) Urchins
   4) Spiny Lobster
   5) Prawn
   6) Rockfishes
   7) Flatfishes
   8) Sea Cucumbers
   9) Wetfish (anchovies, sardines and mackerel)
   10) Crabs
   11) California sheephead
   12) Sculpin & Bass
   13) Tuna
   14) Shark

   NOTE: These 13 fish species (not including kelp) made up over 99 percent of the ex vessel value of the 1999 CINMS commercial catch. Prawn and Rockfishes distributions were based on relatively weak samples. If spatial distributions are to be monitored at the 1-minute by 1-minute level of spatial resolution, then better baseline data would be required.

3. Distribution of catch by block and species group where caught and port where landed for 1999. Can be updated using CDFG trip ticket data.

4. Economic Impact Model.

   Model is a connected set of Excel spreadsheets. This model includes multipliers that translate ex vessel value of catch by species group and port where landed into income generated in the county where the port of landing is located. The multipliers are from the Pacific Fishery Management Council's Fishery Economic Assessment Model (FEAM).

   NOTE: Model gives a reasonably good estimate of the economic impact in the local county economies.

5. Socioeconomic Profiles of Fishermen

   We had profiles from three sources. The first was a sample of Tri-County fishermen (fishermen living in San Luis Obispo, Santa Barbara and Ventura counties) and a sub-sample of these that fished in the Channel Islands. This was from a study by University of Nevada researchers on a project funded by the Department of Interior's, Minerals Management Service. NOAA hired Dr. Caroline Pomeroy who surveyed a sample of squid/wetfish fishermen and Dr. Craig Barilotti that surveyed a sample of all other commercial fishermen (other than squid/wetfish fishermen). The samples were good for capturing the majority of catch and value of catch, but are not representative of all fishermen.

   We know very little about "marginal fishermen", i.e., those fishermen that rely for only a small amount of their incomes from commercial fishing catch. Nineteen (19) percent of the fishermen in the CINMS accounted for 82 percent of the value of catch in 1999.

   NOTE: Given the new rules for accessing CDFG data, it may be possible to design "representative samples" of fishermen for monitoring.

6. Costs, Earnings and Investment

   We attempted to obtain this information in the Pomeroy and Barilotti samples in 1999. We obtained reasonably good information on investment, but incomplete information on costs.

   NOTE: Any future effort must be contingent on getting fishermen's cooperation in developing costs and earnings profiles. ***We consider this a major gap in baseline information for monitoring.***

7. Knowledge, Attitudes and Perceptions of Management Strategies and Regulations

   From the Pomeroy study and an Ethnographic Data Study done by Kronman and others, we have some, but limited information on fishermen's knowledge, attitudes

and perceptions of management strategies and regulations. Especially with respect to the current proposed set of marine reserves.

NOTE: Some other research may have been underway, but not available to the Socioeconomic Panel for the CINMS Marine Reserves. There is a need to update what we know. ***For monitoring purposes, we consider this a major gap.***

8. Nonmarket Economic Value of Commercial Fisheries

   Nonmarket economic values for commercial fisheries includes estimates of consumer's surplus and producer's surplus (economic rents or above normal rates of return on investment). Consumer's surplus may decrease if supplies of commercial fishing products are curtailed to a large enough extent that prices to consumers' increases. Consumers suffer a loss based on increased prices. Such losses could potentially occur as a result of marine reserves.

   To estimate consumer's and producer's surplus requires econometric studies of supply and demand for commercial seafood products. No studies currently exist for California seafood products. We have given California Sea Grant $70,000 to initiate some studies.

   To estimate producer's surplus (economic rent), we need good studies of cost, earnings and investment. We only found one study for the San Pedro Wetfish fishery (market squid, anchovies, sardines and mackerel). They were earning less than normal returns to investment meaning the fishery is over capitalized or economically overfished. Economic overfishing can occur even though biological overfishing has not occurred.

   NOTE: ***Econometric studies are a major gap, but we have already taken some action to fill this gap.***

Recreational Uses

1. Recreational Fishing Use.

   We were able to generate very good estimates of recreational use from charter boats and party boats from a census of 51 operators in the CINMS for year 1999. This use was measured in person-days of use and was mapped in 1-minute by 1-minute cells.

   We were also able to generate estimates of recreational fishing from the National Marine Fisheries Service, Marine Recreational Fishing Statistics Survey (NMFS-MRFSS). Again, we were able to map this use by 1-minute by 1-minute cells. The NMFS-MRFSS spatial data collection is only done on the West Coast of the U.S. There is an unknown amount of uncertainty of the data, since to date there has been no assessment of the data for estimating amounts of use in sub-regional or sub-state geographic units (e.g. national marine sanctuaries).

NOTE: ***The private household boat-fishing component of use might be considered a major gap for purposes of monitoring.***

2. Recreational Consumptive Diving

   As with recreational fishing, we were able to generate very good estimates of recreational consumptive diving use from charter boats and party boats from a census of 51 operators in the CINMS for year 1999. Use was measured in person-days and was mapped in 1-minute by 1-minute cells.

   We were able to generate estimates of recreational consumptive use from private household boats using information from CDFG and the spatial patterns of use from the charter and party boat surveys and the CINMS aerial fly-overs.

   NOTE: ***The private household boat consumptive diving use is considered a major gap for purposes of monitoring.***

3. Recreational Nonconsumptive Uses

   As with recreational fishing and consumptive diving, we were able to generate very good estimates of recreational nonconsumptive uses for those that used charter/party boat or guide services from a census of 51 operators in the CINMS for year 1999. Use was measured in person-days and mapped in 1-minute by 1-minute cells. Nonconsumptive uses included nonconsumptive diving, whale watching, kayaking/sightseeing and sailing.

   NOTE: ***No information was available for private household boat nonconsumptive uses and therefore represents a major gap.***

4. Economic Impact Model of Recreational Use

   We developed an economic impact model of recreational use. The model uses spending profiles for each type of recreational use. For recreational fishermen, these profiles are based on a year 2000 survey of southern California recreational fishermen by mode of fishing (e.g., charter, party or private household boat and by shore fishermen). For consumptive divers and nonconsumptive users, spending profiles had to be patched together from a variety of sources.

   County Census data for sales, wages & salaries income and wages & salaries employment by industry and proprietor's income and employment are used to estimate direct economic impacts from spending estimates. Ranges of multipliers are then applied to estimate total economic impacts. Key here is the assumptions on the percent of recreational users that live in each county where the spending takes place, because there are no multiplier impacts from spending by residents in the county

where they live. We assumed 50 percent of the users were local users (most likely and under estimate, which leads to overestimate of economic impact).

NOTE: ***Percent of recreational use by local residents and multipliers are major gaps.***

5. Profiles of Recreational Users

   We don't have socioeconomic profiles of recreational users of the CINMS.

   NOTE: ***Socioeconomic profiles of recreational users of the CINMS is a major gap.***

6. Nonmarket Economic Values of Recreational Uses

   There are several studies done for recreational fishing in southern California, one which should be available soon based on the year 2000 NMFS-MRFSS survey. For all other recreational activities, both consumptive and nonconsumptive there are few if any studies available for southern California.

   NOTE: ***For nonfishing recreational uses, there are no studies currently available for nonmarket economic values – a major gap.***

7. Knowledge, Attitudes and Perceptions of Management Strategies and Regulations.

   From the Ethnographic Data Study, there is some, but very limited information about recreational fishermen's knowledge, attitudes and perceptions of management strategies and regulations, especially the marine reserves currently being proposed.

   NOTE: ***This is a major gap.***

Nonuse or Passive Economic Use Value

Although there have been several National and California statewide surveys about support for no take areas in the marine environment, there have been no studies of nonuse or passive economic use values of the marine environment in California.

NOTE: ***Although this is a major gap and potentially the largest benefit category of marine reserves, a nonuse value study would be very expensive to implement and would require a multiple-agency partnership.***

Appendix D
Channel Islands National Marine Sanctuary
Socioeconomic Monitoring of Marine Reserves Workshop
March 14-16, 2003
Agenda

Friday, March 14

12:00 – 5:00 **Registration**

4:00 – 6:00 **Plenary Session, Workshop Orientation**

6:00 – 7:30 **Social Event**

Saturday, March 15

8:30 – 8:45 **Plenary Session**

8:45 – 10:45 **Discussion, Development of Measurement/Activity**

(Workgroups – Worksheet A):

- *Commercial Fishing: Catch, Value and Edge Effect* **(S1a)**
- *Recreation*: Joint Session (Charter/Party Boat Use, Private Boat Use): **(S2a & S3a)**
  - *Recreational Fishing and Consumptive Diving: Use, Catch and Edge Effects* **(S2a)**
  - *Recreational Non-Consumptive Users: Use/Use in Marine Reserves* **(S3a)**

10:45 – 11:00 **Break** w/refreshments

11:00 – 12:30 **Discussion, Development of Measurement/Activity**

(Workgroups – Worksheet A):

- *Commercial Fishing: Catch, Value and Edge Effect* **(S1a)**
- *Recreation*: Separate Sessions:
  - *Recreational Fishing and Consumptive Diving: Use, Catch and Edge Effects* (Edge Effects) **(S2a)**
  - *Recreational Non-Consumptive Users: Use/Use in Marine Reserves* (Use in Marine Reserves) **(S3a)**

12:30 – 1:30 **Lunch** - Catered

1:30 – 2:30 **Discussion, Development of Measurement/Activity** (Worksheet B) (Same Groups)

2:30 – 2:45 **Break** w/refreshments

2:45 – 5:00 **Discussion, Development of Measurement/Activity**

(Workgroups – Worksheet A):

- *Commercial Fishing: Economic and Social* **(S1b)**
- *Recreation*: Joint Session: **(S2b & S3b)**
  - *Recreational Fishing and Consumptive Diving: Economic and Social* **(S2b)**
  - *Recreational Non-Consumptive Users: Economic and Social* **(S3b)**

Sunday, March 16

8:30 – 9:00 **Plenary Session**

9:00 – 10:30 **Discussion, Development of Measurement/Activity**

(Workgroups – Worksheet A):

- *Commercial Fishing: Economic and Social* **(S1b)**
- *Recreation*: Joint Session: **(S2b & S3b)**
  - *Recreational Fishing and Consumptive Diving: Economic and Social* **(S2b)**
  - *Recreational Non-Consumptive Users: Economic and Social* **(S3b)**
- *Education & Research* (Combined Socioeconomic and Ecological Session) **(J1)**

10:30 – 10:45 **Break** w/refreshments

10:45 – 1:30 **Discussion, Development of Measurement/Activity** (Worksheets A and B) (Same Groups)

1:30 – 3:00 **Final Session and Lunch**

3:00 **Adjourn**